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UNIVERSITY OF ALBERTA

THE EFFECTS OF INTERVENTION ON THE JUMPING BEHAVIOR OF PRESCHOOL CHILDREN

BY

LORIE G. JOHNSON 

A THESIS

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The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies for acceptance, a thesis entitled THE EFFECTS OF INTERVENTION ON THE JUMPING BEHAVIOR OF PRESCHOOL CHILDREN submitted by LORIE G. JOHNSON in partial fulfilment of the requirements for the degree of MASTER OF ARTS.

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ABSTRACT

Although the daily play experiences of some children may be sufficient to produce improvements in fundamental motor patterns, other children may not benefit to the same degree. Recent studies suggest that many children do not produce mature gross motor patterns without some form of instruction (McClenaghan & Gallahue,1978). This may be especially true for preschool daycare children who acquire several fundamental patterns between the ages of two to five years. Perhaps instruction within the daycare environment would assist preschool children in reaching their movement potential.

The purpose of the study was to analyze the effects of an intervention program on the movement behaviors of preschool daycare children aged 2.5 to 5 years. The evaluation was limited to jumping behaviors. Jumping frequency and variety were measured before and after the intervention treatment, with a control and experimental sample.

A group of ten children received the intervention program, while a group of nine children were exposed to the same gymnasium environment without intervention. The intervention program involved ten lessons based on a movement education approach to motor development. The program content was developed from four main movement components, involving the body, space, effort and relationships. The methods employed by the instructor were based on verbal guidance in the form of open questions, challenge statements and positive feedback and recognition.

Pretest data revealed that preschool children in a gymnasium movement exploration setting, used jumping in a highly functional manner (i.e., jumps were used mostly to dismount apparatus in a forward

direction). The results of this study revealed that, intervention did not significantly increase jumping frequency or variety. Subsequent research, is warranted to determine if the intervention treatment is a worthwhile approach to improving variations in movement behavior. More substantial evidence may have been produced, with alterations to the overall design of this research investigation. For example, a larger sample size, a longer period of treatment, or a treatment specifically focused on the target behavior may have produced significant findings between intervention and the frequency and variety of jumping patterns.

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CHAPTER 1
INTRODUCTION

Need for the Study

From birth, children relate to their world in a physical manner. Acting on and reacting to the environment, they eventually begin to crawl, stand, walk and run. Locomotion establishes freedom, which in turn allows for many opportunities that are exciting and challenging to "new movers". By their preschool years (age 2-5), children are capable of an extensive range of movements, which are displayed within their play activities. Play is said to occupy the largest part of a child's timetable and serves as a primary mode by which children learn about their bodies and movement capabilities. At no time is this more evident than during the preschool years (Norbeck,1979).

Over the last two decades there has been an increasing amount of attention placed on the importance of physical activity in relation to the total development of preschool children (Butcher & Eaton,1988). Through the research efforts of movement specialists such as Laban (1960), Stanley (1969), Staniford (1979), Roberton & Halverson (1982) and Seefeldt (1987), physical movement has been identified as a vital and critical part of human development. These researchers have proposed that movement is the most important means by which children learn about the world around them and themselves.

According to Gallahue (1976), it is time we take a serious look at movement in light of its contribution to the total child. There is a definite need to emphasize the role of motor development in the

educational process of young children.

In order to gain a clear understanding of motor development and it's role in early childhood, researchers must first be concerned with the relationship between maturation and environmental influences. Although many basic movements seem to have a genetic foundation, there is no assurance that children will become proficient in these skills simply through maturation and incidental exposure to them (Miller,1978). A number of environmental factors may in fact play a significant role in the formation of fundamental movement skills early in life. Environmental factors, such as the amount of time children participate in physical activity (Herkowitz, 1977), play space and equipment (Booth,1985 a), and the influence of older siblings and peer modelling (Erbaugh & Clifton,1984) may account for differences in motor skill proficiency. In addition to these factors, research in early childhood development indicates that children are highly influenced by the adults in their environment (Honig, 1986). Therefore it is reasonable to assume that skilful adult interaction may facilitate and enhance children's motor ability (Tamburrini, 1982). This notion is well supported by a number of educators and researchers who believe that fundamental motor development should no longer be left simply to chance (McClenaghan & Gallahue, 1978; Broer, 1961; Gabbard, Leblanc & Lowy 1987). "Too often young children are turned loose on various forms of equipment and expected magically to develop efficient forms of movement behavior on their own. Only through wise guidance, thoughtful interaction and careful planning can we assure the proper development of children's movement abilities" (Gallahue, 1982, p.369).

For an increasing number of children, many crucial early experiences in motor development occur in the daycare setting (Hough, Nurss, & Goodson,1984). There can be no doubt that the daycare environment plays a significant role in the development of preschoolers who spend up to 40-50 hours per week under the direct supervision of adult caregivers (Health and Welfare, 1984). Daycare workers plan activities and experiences by incorporating various types of equipment, teaching methods and discipline strategies that directly affect children. Daycare workers' educational backgrounds and their knowledge of child development contribute to the overall quality of the daycare program (Honig, 1986).

According to Elkom and Hedin (1987), daycare workers have a strong influence over the children in their care. However, very few caregivers and teachers of this age group have had the substantial training necessary to monitor the movement environment in the daycare successfully (Booth,1985 b). Through direct observations of the daycare environment, this researcher has found that daycare workers often view physical activity time for the children as a rest break for the adult. There seems to be minimal interaction between the children and the adults during this time. Tizard (1977) reported that in nursery schools, children's play behaviors were frequently short in duration, poorly elaborated and showed a narrow sampling and use of equipment. This occured when adults adopted a passive role in the play setting. Others have reported that sensitive involvement from adults can have positive affects on many areas of development including gross and fine motor abilities (Smilansky, 1968; Tamburrini, 1982).

An intervention program, then, seems necessary to assure that all children develop an extensive repertoire of fundamental motor skills at an early age (Miller,1978). It is not enough just to recommend adult supervision; but research must provide answers regarding the type of intervention required to benefit children at specific stages of development.

Motor learning research indicates that children need a variety of movement experiences as well as sufficient practice and exposure to a number of movement fundamentals (Schmidt,1977). These factors can serve as a basis for intervention theory. However, there are still many unanswered questions concerning the appropriate instructional strategies that can be applied to the learning of movement oriented behaviors (Singer & Pease, 1976).

One instructional approach that has gained a great deal of recognition over the last forty years is "movement education". Movement education is based on a humanistic approach that promotes child-centered movement experiences. In other words, the children are encouraged to discover a variety of means of moving the body to accomplish certain goals. Unlike the more traditional methods of intervention, the selection of movement education principles attempts to suit the needs of the individual learner. Educators using this method report increased motivation and confidence in children, as well as higher retention and recall of movement concepts (Kruger & Kruger, 1982).

Although movement education has been adopted enthusiastically by educators of young children, there is still a limited amount of scientific support regarding the effects of movement education on motor development. Programs based on movement education method and content

have been operating from a "common sense" base, rather than scientific findings (Engstrom, 1974). The present study was an attempt to measure the effects of intervention on motor abilities and movement behaviors. Instructional stategies were based on movement education principles in order to identify changes and improvements in preschool children's motor behavior.

Statement of the Problem

The purpose of this study was to determine the effects of an intervention program on the jumping behavior of preschool children in a free play gymnastics environment. The intervention was a movement education program designed to encourage changes in the frequency and variety of a wide range of fundamental motor skills, including jumping. Frequency was considered to be the total number of jumps displayed by each child. Variety was considered to be the types of jumps used by the children. The central feature of this observational study was to compare changes in variety and frequency of jumping behaviors, between the treated and non-treated groups.

Operational Definition of Terms

The following terms are identified to ensure clarity throughout this study:

1. Movement Education: In this study, movement education was regarded as a particular instructional approach, incorporating an array of movement experiences on large apparatus. The objective of this type of instruction was to

encourage an awareness and understanding of the body by utilizing various methods of exploration and discovery. The lessons were based on the theory of Rudolph Laban (1948). The overall objective of each lesson was to encourage improvements in children's capacity to move (Locke, 1969).

2. Intervention: This concept referred to the interaction between the instructor and the child and was based on movement education methods and content. The instructor's behavior in the experimental play environment was characterized by her reaction to the children's movement patterns. The instructor intervened using verbal cues that:
a) helped children identify the movement performed,
b) encouraged children in a positive manner to repeat the movement, and
c) challenged children to carry out their own movement choices in a variety of ways. Example: "Were you going over or under that time?", "Good, Mary, you went all the way around!", "Who can travel over it this time?"

3. Free Play: For the purpose of this study, free play referred to a physical play setting in which the child was accountable for his or her own behavior and activity choices. This free play period was characterized by exploration and examination of the environment, without adult intervention (Caplan & Caplan, 1973). It should be clear that the adult's role in this

environment was general supervision and the maintenance of safety.

4. Fundamental Motor Skills: This term referred to a generalized or common movement which serves as a basis for more advanced and highly specific motor activities (Wickstrom, 1970). Physical movements such as walking, running, climbing and jumping are typically identified as fundamental motor skills.

5. Jumping: For the purpose of this study, jumping was defined as a locomotor pattern in which the body propels itself off the floor or apparatus into a momentary period of flight, landing on one or two feet (Graham, Holt-Hale & Parker,1987).

Delimitations

This study was conducted with a group of children attending a goverment subsidized daycare facility in the Edmonton area. The children, aged 2.5 to 5 years were involved in an indoor activity program in a large gymnasium setting. The experiment was scheduled for two mornings each week for a total of seven weeks (this included pre and posttest observation times). Each group, experimental and control, was separately involved in ten 30-minute play sessions on large gymnastics apparatus. The experimental group received a specific intervention program to encourage changes in fundamental motor skills, while the control group had no

intervention. Observations were made on one fundamental motor pattern only: the frequency and variety of jumping behaviors before and after treatment.

Limitations

Within this experimental design, the researcher was aware of external conditions or factors that may have directly affected the results of the study, other than the proposed independent variable(s). A number of these external factors are commonly noted in research design literature, and several have been associated with conditions relating to human behavior (Kidder,1981).The recognition of these external variables allowed for alterations in the overall design of the study, and the implementation of a number of procedures to lessen the effects on the dependent variable.

For example, maturational changes were predicted to have an affect on the preschool sample over the seven weeks of the experiment. Although "testing effects" were difficult to separate from maturational factors, a significant change in the experimental group scores over and above those of the control group would indicate involvement of the independent variable.

A second influence in this study was identified as previous involvement or past history and experience. It was not possible to control for the subjects who had more experience in similiar activity programs involving gross motor play. As a result, some children may have been more familiar with large gymnastics appartatus in an indoor setting.

A third variable considered in this study has been outlined in the literature as the "Hawthorne Effect" (Rothstein, 1985). When the

experimental conditions are known to the subjects or the subjects are made to feel special, this may alter their natural behavior. This factor was reduced to some degree when both groups of children were exposed to and perceived the physical play environment in the same manner. The control group and treatment group were unaware that any differences were present regarding adult involvement and lesson content.

Other variables such as time of day and attendance levels, may have accounted for changes in data. This study was conducted during the same time periods each morning, twice per week. It was predicted that preschool children were more attentive to activity in the morning than in the late afternoon (due to fatigue), and therefore a higher frequency of motor activity may be present for morning programming.

The number of children attending each play session may have been influenced by illnesses. Unfortunately, children attending communal environments such as daycare settings are more frequently subjected to childhood diseases than are non-daycare children (Moser, 1988). Therefore, children who were exposed to a higher number of play sessions may have produced higher frequency and variety scores than those who were absent for a portion of the program.

Another limitation of this study, concerned the willingness of the subjects to participate in each activity session. Generally, young children exhibit frequent changes in mood and attentiveness. A fluctuation in behavior from one activity session to another due to a disruption in daily routine, emotional upset, fear or boredom, may have increased or decreased activity level (Mitchell, 1973).

One final limitation of this study concerned the influence of unplanned interaction between the regular daycare personnel and the children due to injury or washroom breaks. Daycare regulations require one staff member to be on hand in case of injury or accident. Just the mere presence of the daycare staff member may have had an effect on the children's behavior in this study.

CHAPTER II
LITERATURE REVIEW

Children are complex beings. In order to study their behavior in detail, researchers have often been confined to one particular area of study, such as physical, cognitive, social or emotional development. In fact, most developmental textbooks concerned with childhood are divided into these particular categories. Most authors focus on normative descriptions of various age groups, as well as scientific findings from areas such as motor development, psychology, sociology, medicine and education. Although these resources are helpful and often discuss the concept of the "whole child", there appears to be less emphasis placed motor development and more discussion regarding social, emotional and mental development. (Halverson, 1966). For example, in recent textbooks on child development by Berk (1989), Eliason & Jenkins (1986), Robinson (1983) and Schickedanz, Schickedanz & Forsyth (1982), motor development is mentioned only briefly. The lack of attention given to motor development by these authors should not however diminish the overall importance of movement and its influence on several areas of growth and development.

In order to explore the concept of the "whole child", motor development and movement behavior should not be overlooked. Researchers are just beginning to realize that more detailed investigations pertaining to children's motor behavior may have a significant impact on educational methods and our understanding of human development (Seefeldt, 1987).

This review of literature is based on research investigations which are associated with the motor development of young children. The information

has been organized into five main areas which relate to this particular study: a) motor development patterns of preschool children, b) environmental influences: the physical play setting, c) adult intervention: role of the adult, d) intervention stategies and preschool motor development, e) intervention programs and movement education.

Motor Development Patterns of Preschool Children

Current research in the area of motor development has been based to a large extent on earlier investigations dating from 1930 to 1960. During this time, several longitudinal studies regarding children's fundamental motor patterns were undertaken. These investigations were based on detailed and direct observations of small groups of children (Curtis,1987). Researchers were concerned with formulating normative values with extensive descriptions of various fundamental motor patterns.

Through the dedicated efforts of researchers such as Shirley (1931), Gesell & Thompson (1934), Bayley (1935) and Gutteridge (1939), early developmental scales were constructed in order to outline various movement characteristics and sequences of behavior. According to Halverson (1974), these early studies had some shortcomings. First of all, several motor behavior items became part of developmental scales simply because they were observed a number of times. Many of the items included were not comparable to other scales because either the descriptions were too hazy, or the environmental conditions in which the behaviors were observed were too varied (Halverson, 1974). For the most part, these classic studies provided a general means by which the movement behaviors of the majority of children could be predicted. This information provided

guidelines for movement ability according to age and gender. For example, Bayley (1935) commented on the possibility that motor functions during the first three years of life were less discrete and independent than the motor skills measured in later stages of development. These findings led other researchers such as McCaskill & Wellman(1938) to investigate the movement patterns of preschool children between the ages of 4-6 years. The objective of their research was to determine common movement patterns of this age group and the sequence of motor ability. The results of these studies indicated that children's movement patterns improve with age and that children were able to perform most skills with a mature pattern by age five and six, the exception being throwing and catching.

McCaskill and Wellman (1938) also found that preschool boys were superior at climbing activities than girls. Girls were more proficient than boys at hopping and skipping. The differences found between age groups and gender were discussed in the context of genetic disposition, with very little emphasis on the role of environmental factors. As a result of these early studies however, common movement characteristics were identified and placed in a sequence or order by which they were acquired.

By the 1940's researchers in the area of motor development set out to describe and analyze the mechanics of fundamental movement patterns in detail. This was partially due to advancements in recording procedures such as cinematographic analysis and the use of devices such as the electrogoniometer (Wickstrom, 1977). Motor development specialists were able to record basic movement patterns in terms of joint angle, body position, balance and coordination.

By the mid 1950's and early 1960's, research in the area of children's motor development was concerned with the in depth analysis of single fundamental movement patterns of preschool children. For example, Clouse (1959) measured the running patterns of six preschool age boys between the ages of 1.5 and 5.5 years. She found that the boy's running speed increased with age due to an increased length of stride and a longer non-support period. These distinguishing characteristics were said to assist in identifying skilled runners versus non-skilled runners. The differences in ability found between subjects was attributed mostly to physiological factors such as body height and length of the limbs. The possible influence of environmental factors was not mentioned in these studies. Other in depth investigations with preschool children were conducted by Deach (1950) and Jones (1951), and involved catching and throwing skills with 2 to 6 year olds. These longitudinal studies indicated that certain types of throwing and catching styles were used by children depending on their body proportions, age and the actual size of the object/ball. These findings indicated that an external variable, such as equipment size, may have an affect on how children execute a throwing movement.

Other longitudinal studies were conducted with fundamental skills such as jumping. Bayley (1935), Gutteridge (1939), and McCaskill and Wellman (1938) found that jumping patterns followed a progressive level of difficulty throughout the preschool years. Other researchers (Wickstrom, 1970) suggested that jumping patterns progressed from initial to elementary and finally mature levels of development. For example, the preschooler's initial attempts at jumping revealed a rather rigid movement with fairly straight limbs. This type of jump has been characterized as a

step-down jump. Progressive changes in jumping movements were accompanied by a shorter step and a higher lift of the support leg to ensure a flight phase (Wickstrom, 1970). Godfrey & Kephart (1969) described more mature stages of jumping, where the knees, ankles and hips were bent and then forcefully extended to project the body into the air off the floor or apparatus. Advancements in jumping were noted as children produced this mature pattern from increased heights and distances.

The various stages and levels of jumping ability were also examined by Hellebrandt, Rarick, Glassow and Carnes (1961). These researchers conducted a detailed analysis with children from 17 months to 6 years. Fourteen male subjects from the original sample were evaluated on their jumping ability. The research team involved in this lengthy project recorded each child's jumping development with frame-by-frame photographs or cinematograms. The researchers concluded that at age 2.5 years all of the subjects could jump well from a variety of low to medium heights and by age 3 the boys exhibited jumping skills with a distance objective. More than three quarters of the children were able to perform a mature type of jump by age four, in which they were able to generate a great deal of propulsion by crouching slightly and springing up and outward. The researchers were able to produce details on the evolution of spatial and sequential components of jumping movements of preschool age males.

By the 1960's, research had addressed two aspects of motor behavior for preschool children: a) the sequence and order of common motor behaviors, and b) the actual mechanics of several fundamental skills. From this point, motor development research involved specific tests and

screening inventories in order to measure the physical performance of preschoolers. These inventories were originally used to screen and identify children with possible handicaps from age three to six years. The most widely used motor inventory for preschoolers was the Developmental Indicators for the Assessment of Learning, better known as the DIAL test (Mardell & Goldenberg, 1975). This particular motor inventory included fine as well as gross motor tasks. The gross motor tasks involved throwing, catching, jumping, hopping, skipping, standing still and balancing. Perhaps the most useful information received from these large inventory examinations pertained to noted differences between preschool children in terms of gender, race and age groupings.

More recent studies have been conducted by Morris, Williams, Atwater and Wilmore (1982) and by Broadhead and Church (1985). Highlights from these studies included findings that noted differences in performance between boys and girls aged 3 to 5 years old on test items such as a distance throw, speed run, and long jump- in each case favoring boys. Similiar studies which involve a multivariate analysis for gender, race, body structure and age have also provided more in depth information regarding developmental trends and the genetic foundation of motor control (Beitel & Mead, 1982; Docherty, 1983). These types of studies have improved our understanding of motor function in early growth and development, and yet a number of associated questions remain. For example, how can movement patterns and motor ability be enhanced or improved at a young age?

Environmental Influences on Preschool Motor Development

In addition to predisposing genetic factors, what role does the environment play in motor behavior? Can certain environmental influences be identified? Can these variables be manipulated to cause changes in motor ability and movement patterns? Researchers have recognized the need to isolate certain external or environmental factors in order to assess changes in movement ability among young children (Erbaugh & Clifton, 1984; Frost & Stickland, 1978).

Environmental factors arise from two sources: a) those conditions which are imposed on the individual due to circumstance such as cultural traditions, living conditions, or deprivation; and b) those environmental influences which are specifically designed to stimulate changes in human behavior, such as various forms of instruction, play opportunities, equipment, and activity space. Environmental factors which are associated with children's motor behavior in particular play settings will be discussed in this portion of the literature review. Other factors, such as human interactions, will be discussed in more detail later on.

Play Settings and their Effect on Preschool Motor Development

A number of studies pertaining to preschool children's motor behavior have dealt with the conditions of particular play settings and their overall effect on children's play patterns. Hayward, Rothenberg and Beasley (1974) have noted that "frequently, one hears misinformed adults express the notion that children are not bound by environmental cues; children can play in any setting. "Results from Hayward, Rothenberg & Beasley's (1974) research indicated that the kind of apparatus available to

children may, in fact, control group interaction and physical movement, even when the child attempts to go beyond the usual modes of equipment use.

For example, the type of equipment used in most preschool play settings may contribute a significant amount to how children will develop basic motor patterns such as jumping, climbing and balancing (Frost & Strickland, 1978). A research study conducted by Frost and Campbell (1977) revealed that children involved in free play sessions with both creative and traditional playground equipment (large apparatus) engaged in gross motor play over 77 percent of the activity session and only 3 percent in socio-dramatic play. The researchers concluded that the type of equipment in play environments may significantly influence the type of play or movements in which children engaged. Naylor (1985) has noted that older children in free play settings tend to choose structures or apparatus that pose a greater risk factor, giving feelings of vertigo: activities such as swinging, hanging upside down, and climbing heights. The older children in this study demonstrated a need for adventure and required a higher level of challenge in the play environment.

In contrast, Karlsson and Ellis (1972) found that 3 to 5 years olds showed definite preferred motor behavior when exposed to various pieces of climbing apparatus, in a free play indoor gymnasium setting. The preschool children in this particular study moved more frequently on climbing apparatus that was considered the least complex e.g. stable wooden box. The children showed a moderate preference for higher trestles and the lowest preference for a net rope, the most challenging piece of apparatus. "The most surprising result was that no trend toward an

increase in preferred height level appeared with repeated exposure to the apparatus over five play sessions" (Karlsson & Ellis,1972, p.41). It was expected that repeated exposures to the climbing apparatus would lead to an increase in the use of more complex heights and levels. Various heights and levels of equipment did not ensure that the preschool children would elicit superior or more frequent climbing ability. Some researchers have also stated that some large play apparatus may, in fact, limit children to certain movement patterns simply due to the construction, height, or level of difficulty of the apparatus (Henniger, 1985; Riggs, 1980). Parten (1933) noted in studies of preschool children's social play, that swinging occurred infrequently among young children because the particular apparatus was too difficult to mount. Large apparatus that was not developmentally appropriate did not apparently serve to enhance children's movements.

In fact, large apparatus, commonly found in many play settings and daycare environments, both outdoor and indoor, may discourage certain motor behaviors. Booth (1985 a) and Frost & Sunderlin (1985) suggested that large equipment is often designed with a minimal range of difficulty for various age ranges, resulting in high levels of boredom, inactivity or lack of involvement all together. Parnell and Ketterson (1980), have suggested that accidents often occur on large traditional playground apparatus, as a result of children's attempts to make the equipment more challenging or interesting. Hardiman, Goetz, Reuter & LeBlanc (1975) observed that even when a variety of equipment is available, some children in free play settings, refrain from interacting with the apparatus completely and thus do not fully develop many fundamental movement skills. This may

be particularly true for children who lack coordination or physical ability, or exhibit some fear.

Another factor which may influence the movement behaviors of preschoolers is the amount of apparatus in the play environment. A classic study conducted by Johnson (1935) found that when additional large apparatus was added to the playground there was an apparent higher frequency in "bodily exercise". The researcher noted an increase in frequency of gross motor actions, such as swinging, running, sliding, climbing and jumping. Johnson (1935) also stated that when the amount of equipment was reduced in the play setting, children were more likely to exhibit undesirable behaviors such as quarreling, crying and hitting. According to Booth (1985 a) there should be a sufficient amount of equipment to ensure maximum participation for the 2 to 5 year old children. Progressively adding more novel and complex apparatus to the gymnasium environment may have an effect on children's movement behaviors (Flinchum, 1988).

Finally, the amount of play space is also said to influence preschoolers' physical play responses. Caplan & Caplan (1973) suggests that the shape, size and contour of the play area will dictate the nature of movement behaviors. For example, indoor settings in many daycare facilties are small and therefore large motor activity is restricted. Clark, Wyon, & Richards (1969) observed that restriction of play space increases conflict between children and places limits on physical activity. Extensive research by Sylva, Roy and Painter (1980) in British nursery schools indicates that child care facilities with larger indoor play areas had a higher frequency of gross motor play than smaller facilities. Observations

indicated that the younger children (2 to 3 yrs. olds) in a larger facility were involved in gross motor play three times more than in social or pretend play.

Sinclair (1973) has suggested that a standard of thirty-five square feet per child is needed for indoor activity space, in which safe unrestricted movement can occur on small pieces of apparatus. Field (1980) suggests that activity spaces are also disruptive or ineffective when they are too large. Preschool teachers report that children act in an uncontrolled manner in large open spaces. According to Booth (1985 b) and Thompson (1976), this behavior occurs when children's energies are not channeled through the use of apparatus. Educators must provide sufficient room for children to move freely, and yet at the same time reduce or section large play spaces with appropriate equipment or dividers, in order to provide a challenging and safe environment.

Perhaps the most in depth analysis regarding play space and the type and amount of apparatus in the play environment, has been completed by Wetton (1980, 1983). Wetton monitored the interest and activity level of preschool children on large apparatus in the nursery school setting. The researcher's first investigation was conducted with children 3 to 4 years of age, in which their movement behaviors were monitored on large indoor play apparatus over a three day period. The children were free to visit the play area throughout the day and therefore their interest in the large apparatus was not controlled by adult interaction. In fact, Wetton (1980) stated that at no time during the three days was there a staff member in attendance in the large apparatus area. Results showed significant differences between three and four-year old children and differences

between boys and girls in their self-selected activities. For example, the three-year old children had a much wider range of interest and played individually on the equipment. The four-year olds showed less interest and played more in small groups around the area.

Wetton (1980) stated that the majority of three-year olds were stimulated to explore and experiment, while the four-year olds however had passed through the exploratory stage and were now needing stimulus of a different kind. For instance, either the apparatus needed re-arranging or better still they needed help from the teachers. Wetton's observations of the nursery environment indicated that adults placed no emphasis on physical activity. Wetton stated that "indeed it was fair to say that locomotor activity and vigorous gross motor activity were suppressed by the adults in the nursery" (1980, p.13). The results suggested that the four-year old children were not interested in the apparatus and were using the area as a compensatory space or not at all. Almost half the children in the study did not visit the area at any time during the three day observation. Wetton (1980) suggested that the apparatus alone did not present enough stimulation and lack of adult involvement also contributed to this low activity level.

Wetton's (1983) second study produced similiar results, in which four-year old children, from two separate nursery school environments, were observed over six sessions. The children were evaluated on their locomotor and gross motor interest during free play periods indoors. The focus of the study was to record the children's movement experiences as well as external factors that may influence behaviors. The frequency of movement activities such as chasing, rough and tumble play and large

apparatus play were compared in relation to other activites (fine motor and sociodramatic). Special details were also collected in regards to the teachers' interaction with the children, including his or her, encouragement or suppression of gross motor or locomotor activity. According to Wetton, (1983) boys showed a higher rate of chasing and vigorous activity than girls. The four-year old girls were observed "wandering" most frequently. In other words, most girls seldom settled on sustained play of any kind or they were involved in sociodramatic play, such as dress-up or house play. The researcher also noted that although the children appeared to display a compulsive urge to mobilize themselves, physical activity which was extremely noisy or vigorous was suppressed by the adults in the environment. Wetton (1983) concluded that the strongest external influences directly affecting movement choices by four-year old children were amount of space and equipment, and, more critically, the intervention of adult caregivers.

From these studies, it is apparent that features of the physical play environment, such as amount and type of equipment, as well as space, appear to have an effect on the motor behavior of young children. However the effective use of play apparatus must also be attributed to the presence of other human beings in the environment. The influence of the adult in the child's play environment is a critical factor. Cratty (1968) stated that, "the mere presence of equipment is not enough . . . someone must be present as an instructor or stimulating friend or parent in order for the equipment to exert a significant influence over the capabilities and activity levels of children using it" (p.68).

The Effects of Adult Intervention on Preschool Motor Development

Most adults have memories of their own childhood experiences; of playful interaction with family and friends. Very simply stated, play is a vehicle by which we all learn. What then, is the adult's role in children's play? Can adults effectively assist children, or does the mere presence of an adult change the behavior of children in some way? In terms of motor development and the enhancement of physical skills, educators are also concerned with methods and stategies which will enhance the development of movement fundamentals.

The Role of the Adult in Motor Play Behavior

"Adult involvement in child's play can be either supportive or destructive" (Frost & Sunderlin, 1985, p.283). Adults who try to implement rules, and put restrictions on the way children behave in the play environment, have a tendency to make play more like work.

In a study conducted by King (1979), young preschool children felt that what their teacher wanted them to do and what they wanted to do, was the difference between work and play. Mangin (1983) stated that when an adult interferes, the play often becomes less interesting and intense for the child. This may certainly be the case, if the adult does not understand the nature of the play activity and imparts his or her own values and interests on the child. Smilansky (1968) suggested that adult involvement can be a valuable part of a child's play world, only when the adult seeks to respect play and minimizes disruption of the play episode.

The adult has the opportunity to assume a number of roles in children's play environments, as an observer, facilitator, supervisor or a

guide. The degree of interaction may vary according to the role. Some play settings will dictate more interaction than others. More traditional views indicate that children will develop physical coordination and motor skills through free play choices on equipment without a high degree of adult interaction. Movement education specialists, however, state that a lack of quality adult-child interaction often puts young children at risk physically as well as educationally (Broadhead & Church,1985). In a study completed by Tizard (1977), the quality of children's play was reduced, due to the passive roles adopted by nursery school teachers in a indoor play setting. The children's play was frequently of short duration, poorly elaborated, repetitive and involved a narrow sampling of the available materials and equipment in the environment.

The amount of interaction given to the child by the caregiver or adult in a number of daycare settings has proven to be minimal. Jacobson & Owen (1987) found that a group of daycare workers encouraged motor behavior less than 20 percent of the children's play time. Clark, Wyon & Richards (1969) observed a group of three- and four-year olds in a nursery school physical play setting. The children were free to occupy themselves, and although the teachers occasionally suggested an activity to an unoccupied child, there was almost no interaction between the adult and the child to re-direct or enhance activity. Other research findings indicate that adults have a tendency to supress physical behavior in certain environments. For example, Butcher & Eaton (1988) found that adults discouraged gross motor play indoors in the daycare setting. Activities such as running, jumping and climbing were not suited to the indoor play area provided. "While it is reasonable to assume that an adult may inhibit a

child's play if the intervention is clumsy and does not take its cue from the child, there is also evidence to suggest that sensitive adult participation can facilitate and enhance [the play]" (Tamburrini, 1982, p.209).

Sutcliffe, Billett & Duncan (1980) have noted that children need the opportunity to develop basic movement patterns through suitably matched experiences. These experiences can only be provided if children are involved in a wide range of activites, in which the efficiency of their movements depends considerably upon the involvement and assistance of educators. Gabbard (1988) contends that adult involvement is crucial in developing a foundation for the quality of movement behavior in young children. There is no doubt that adults have a very strong influence over young children. These issues force us to ask ourselves just what sort of intervention is appropriate for this particular phase in the developmental cycle of preschool children (Elkind,1977).

Intervention Stategies and Preschool Motor Development

Educators have been very concerned with developing instructional strategies that will enhance learning and elicit positive change and improvement with children of various ages. Educational and instructional methods are often based on the needs and interests of the age group involved. Preschool children exhibit many unique qualities which must be taken into account when planning and implementing various programs. For example, activities that account for children's natural need to explore may enrich motor development experiences for the preschool age group (Riggs, 1980).

Educators often discuss the concept of "planned or play oriented" movement experiences for children (Herkowitz, 1977; Howe, 1988). The adult's role is to provide a play setting for children by offering appropriate equipment, space and instructional methods that enhance movement ability. The broad and general nature of these guidelines can, however, produce varying results.

In a study by Myers (1985), a single group of children between the ages of 4 and 5 (kindergarten) were evaluated on their motor behavior in two separate and alternating environments. In one environment the children were allowed to play freely in the outdoors without adult interaction; the other environment was a planned physical education class with a teacher guiding the same group of children in activity. Using a prepared checklist, an observer recorded the children's motor behaviors for 35 minutes in each play setting over a nine week period. The data revealed that kindergarten children displayed more locomotor and gross motor behaviors during free play than in the prepared physical education environment. The observer noted that the children in the more structured environment spent more time getting out supplies, waiting in line for a turn and listening to instructions by the teacher. In other words, class time spent on management duties, was directly related to a decrease in physical activity and practice time for the children in this traditional environment. This was not the case in the free play setting. The results of this investigation indicated that children were more physically active in free play than in a traditionally based physical education class. Obviously certain features of the physical education program needed to be adjusted in order for the program to suit the needs of the age group involved.

Recent studies indicate that teacher training can improve the quality of interaction between the adult and the child, with subsequent improvements in play behaviors. This has been demonstrated in three separate studies by Wade (1980) Collier (1985) and Van Der Mars & Butterfield (1988).

Wade (1980) analyzed a group of 69 children between the ages of 3 and 4 years from a preschool program. The children in this study were observed on large outdoor play equipment. The researcher pretested the play behaviors of the children and their interaction with their preschool teachers who were present in the environment. The preschool teachers were then given training in a variety of indirect teaching methods. After the training program, the teachers were observed once more in the outdoor play environment with the children. The preschool teachers showed an increase in both positive verbal and positive non-verbal interaction and made use of questioning, accepting and praising techniques. The children's play behavior improved as a result of this in a number of ways. The research findings indicated preschool children showed a marked increase in social and social-cognitive behaviors with more group interaction. The researcher did not directly indicate that the frequency or quality of gross motor activity increased in the large apparatus setting. It may be acceptable to speculate that higher social and cognitive involvement on large apparatus was a reflection of a more active and confident child. Wade (1980) included some extremely valuable comments regarding the appropriateness of teaching techniques that emphasize positive feedback by the adult in the form of verbal and non-verbal cues.

Collier's (1985) study also used preschool children between the ages of 3 and 5 years. The children's preschool teachers were given an eleven-hour training program on various techniques and teaching methods related to play enhancement. The training program involved written material, group discussion and video tape analysis of the teachers' performance. The researcher was interested in measuring changes in the cognitive and general play behavior of the preschool children as a result of increased levels of adult intervention. As in Wade's (1980) study the teachers made use of more verbal cueing with the children. The experimental group of children exhibited a higher level of social play and verbal involvement as a result of the intervention. Although intervention had a positive effect on these variables, the results indicated that intervention did not affect physical play behaviors to the same high degree. The researcher stated that one reason for this was that the teachers did not focus their verbal cues solely on physical activities. The instructors engaged in a wide range of verbal comments regarding numerous topics in the play setting. Perhaps more specific verbal cues regarding movement behaviors would have a greater affect on preschool children in free play situations.

A more direct method of assisting preschoolers' motor development was used in a pilot study conducted by Van Der Mars & Butterfield (1988), in which preservice teachers were asked to instruct children 3 to 6 years of age on basic motor skills such as stair climbing, running, jumping, throwing and catching. Each child's motor ability was pretested prior to the treatment program to determine his or her level of motor maturity and to identify weak performance areas. The entire sample (24 children) was divided into experimental and control groups. The control group received

no formal instruction aimed at developing mature patterns of gross motor skills, and continued with their physical play time as usual. The treatment group received an instructional program that was scheduled for eight lessons, 40 minutes each. The treatment used was identified as the Performance Base Curriculum developed by Loovis & Esring (1979). The program involved accommodation of each child's rate of development in terms of equipment, and the amount of time given to each skill opportunity. The instructional method was more direct than selective or child-centered. The intention of the adult intervention program was to improve the skill level and ability of the preschool children when performing the fundamental motor patterns listed above. The preschool teachers used direct verbal cues, physical assistance and demonstrations to enhance performance. Completion of posttesting results revealed that the experimental group performed significantly better than the control group, which had no adult instruction. The experimental group performed considerably better on test scores for running, jumping and ladder climbing, and somewhat better on throwing and catching activities. The pilot data indicated that adult instruction on specific motor ability test items could improve the test scores of preschool children. These quantitative measures for young children were relatively easy to predict based on increased practice time and adult involvement. However, these findings did not reflect the more sensitive qualitative changes in the children's ability to perform a greater range of movements on their own.

Specific and direct modes of instruction are often limited in terms of providing for individual differences in readiness, rates and abilities for learning new movement skills. Direct methods are typically involved in the

"product" more than the "process". Other methods of intervention may in fact be more effective in enhancing quality, variety and success in movement ability.

Intervention Programs and Movement Education

There is a growing amount of evidence that children function at their most capable level when the learning environment matches their intentions and capabilities (Tamburrini, 1982). This theory reflects and describes the main objective of movement education. Movement education has been described as an instructional approach to motor development that involves an indirect style of teaching by providing a particular method and content (Locke,1969). A primary goal of the movement education approach is to provide child-centered activities. "Child-centered" refers to learning opportunities in which children make their own decisions and provide their own answers to events occurring in the learning environment (Herkowitz,1977). The role of the instructor or teacher is to guide these events in such a way that children are given maximum opportunity to respond successfully (Ellis, 1973). This approach has been outlined by Herkowitz (1977):

> The movement program should be designed to encourage successful experiences. The learning environment should include: positive and encouraging teachers, developmentally appropriate equipment which allows for a broad range of readiness levels, freedom to explore play apparatus on the child's own terms (unencumbered by formal directions) and solving open ended movement problems set by the adult where all "solutions" are equally acceptable. (p. 16)

An intervention program based on the movement education approach: a) gives children an opportunity to interact with the environment in a natural and exploratory manner, b) allows children to attempt movement patterns that are unique and individulized and c) helps children become more aware of their own movements. In other words, movement education principles are considerate of individual levels and rate of development. In the words of McClenaghan and Gallahue,

> By focusing primarily on the learning process itself, rather than the product of learning, the movement education approach encourages children to develop and master fundamental movement abilities, find success at their level of ability and express themselves in a creative manner. (1978, p.131)

The actual content of movement education intervention programs, involves the concepts outlined in the original work of Rudolph Laban (1948). Through his extensive observations of human beings, Laban developed a means of describing movement behavior. Laban developed four main concepts: Body, Space, Effort and Relationships. These concepts were used to identify any movement in relation to: how the body moved, where the body moved, the quality of the movement and finally, it's relationship to the environment itself. Laban's valuable research made it possible to identify and describe movement in far more detail. These concepts were later adopted by several British physical educators, and

developed further into movement components and themes (Cameron & Pleasance, 1963; Jordan, 1966; and Buckland, 1969).

Movement education programs based on the four main categories are often divided into lesson themes. Themes, according to Gallahue (1982), serve as the central idea around which the lesson is focused. Developmental movement themes divide the lesson content into manageable components that children can understand and concentrate on. For example, a movement experience may involve focusing on movements that emphasize body shapes, or various body parts, or changes in direction. The lesson content allows a wide range of fundamental movement patterns to be used such as climbing, running, and jumping. The movement theme serves as a basis from which the instructor can utilize various methods of interaction with the children involved.

A number of instructional methods are now associated with movement education based intervention. The role of the instructor in the learning environment is very critical. These methods of interaction are mainly delivered through verbal guidance by the instructor or teacher (Riggs, 1980; Stanley, 1969).

Perhaps the most common instructional method used in movement education involves open questions and challenge statements. Open questions are basically verbalizations addressed to children that require some type of answer, which may be presented verbally or physically by children. These types of questions help children focus on some aspect of the movement, and allow for a number of solutions to be developed by children themselves. Other questioning techniques such as "guided discovery" involve a more sophisicated level of problem solving, in which the question does have a

particular answer. The instructor's role in this case is to present children with smaller sub-problems that encourage them to eventually discover the correct answer (Pangrazi & Dauer,1981). Challenge statements are similar, and yet the instructor does not deliver these statements as open-ended questions. Challenges provide informal limits on children in an attempt to motivate them to discover new and different ways of moving. For example, the instructor may say: "Try that movement by using both your feet.", or "See if you can go around it this time, instead of over". This method has been described by Ellis (1973):

> The teacher guides the learning through setting graduated problem solving experiences in movement. All children are allowed to respond according to their perception of the problem, selecting and utilizing information from past experiences to solve each new problem and making judgements as to the effectiveness of their solutions. (p.3)

According to Kruger & Kruger (1982), the use of questioning methods and challenge statements encourages children to become more aware of their own body movements. Children begin to understand the purpose of various movements in a variety of situations. The ability of children to find solutions and to make decisions regarding their own individual movements has been identified as an extremely important feature of this learning process (Riggs, 1980).

Another critical method of intervention programs based on movement education involves positive reinforcement and feedback. Children's involvement in any activity setting relies to a high degree on

how they feel about what they are doing (Sinclair, 1973). Movement education methods involve a high rate of positive verbal reinforcement by the instructor. Each movement attempt is considered in relation to the child's own personal ability, without an external criterion. The instructor reinforces the success of these movements with verbal comments and gestures that produce a positive and accepting learning environment. Children relate their movements with positive feelings, which often leads to an increase in self confidence and future involvement (Flinchum,1988).

The values of movement education as a learning medium have been established by Ludwig (1970) and is summarized as follows:

> 1. Success is based on the personal goals and the developmental level of children involved in this learning environment.
> 2. Children are involved in a process of making decisions, leading them to be responsible for their actions and to understand the purpose of their own movements.
> 3. Challenges are provided which may be related to more divergent modes of thinking and increased creativity on the part of the learner.

Despite the fact that movement education methods and content appear to be valuable avenues for learning, very few research studies have looked at the direct affect of these programs on young children. Concepts and methods related to movement education have been utilized by Miller (1978) and Booth (1985 b). These researchers used intervention programs based on some of the concepts and methods described above.

For example, Miller (1978) conducted an extensive twenty- seven week investigation with preschoolers. The purpose of this study was to

determine the effectiveness of intervention for children three to four years of age. A group of 79 children were divided into one of three treatment groups. One group received intervention from two trained movement specialists, a second group was taught by parents under the same format and a third group did not receive adult intervention, but was permitted to use all available equipment for self-initiated activities, that is, free play. A fourth group from another local nursery was included in the study to control for the effects of maturation. The intervention program employed body awareness activities in which the children's movement patterns were guided by verbal cues and open question from the adult. A portion of each lesson was used for creative and rhythmic activities, which included singing games and locomotor and spatial patterns. The intervention program did provide for isolation of fundamental movement patterns in which the instructor gave more direct cues to improve various components of the children's movement abilities. The children in both experimental groups were encouraged to practice and repeat a variety of movements.

The results from Miller's (1978) study indicated a number of significant differences between children who were exposed to intervention and children who were not. However, the free play group and the control group were not different from each other. The free play group which had the opportunity to play on specialized equipment for the twenty-seven weeks, did not make any more significant gains in skill development than those children who played only at home and the nursery school (the control group). These findings were later attributed to the fact that the control sample had motor development equipment available to them on a free play basis. "Although the children were not given formal instruction,

the children were supervised by their teachers in the nursery. Therefore, the experiences of this group were not markedly different from the free play experimental group" (Miller, 1978, p.101). The most important results of the study were that children in the free play group did not improve to the same extent as the two groups who received intervention. It was interesting to note that the children in the free play setting often used the equipment for dramatic, rather than motoric play. Miller stated that "when left to their own devices, children usually do not practise a wide variety of fundamental motor skills...without some form of guidance from adults, young children's movement patterns are likely to be underdeveloped and their repertoire of movements lacking in variety" (1978, p.102).

Finally, the results of Miller's (1978) study indicated that both teacher intervention and parent intervention groups performed equally well on fundamental movements after the treatment. The research indicated that instruction was equally effective whether it was provided by teachers alone or by parents and teachers working cooperatively. The success of the movement program was based on the adult's ability to relate to the child's basic needs and interests. This notion was also illustrated in a study conducted by Booth (1985 b).

Booth (1985 b) compared younger and older preschool children in two different movement programs on large gymnastics apparatus. The purpose of the particular study was to analyze the effects of the human environment upon the child's ability to move in a more confident and self-reliant manner. Booth, identified this concept as "movement autonomy" (1985 b, p.18).

Booth's (1985 b) year long study was undertaken with two groups of children ranging from age 3 to 6 years in two separate facilities. The researcher monitored various aspects of the two movement education programs in terms of organization, instructor behavior and parental involvement. Results of the study indicated that children developed a higher level of movement ability providing the teacher used intrinsic motivation and allowed for independent exploration. Instruction was more effective when there was a higher degree of teacher modelling and the use of simple words with appropriate actions. Under these conditions the children in the study showed marked improvements in movement autonomy.

There are a number of educators and researchers who have made recommendations regarding intervention in relation to motor enhancement for young children. Some of the information is based on scientific findings, such as Miller (1978) and Booth (1985 b), and yet a great deal of information is provided by various educators with numerous years of practical experience with children.

For example, Boucher (1988) commented that:

> Young children should be free as possible to select the movement activities they enjoy and wish to work with the most. The role of the educator is to praise the child's efforts in movement, to ask questions which encourage the child to try another way of moving and to encourage the child to find another way to use the available equipment or apparatus (p. 42).

The concept of positive encouragement and reinforcement is shared by others in the movement education field. Reinforcement is seen as a

important teaching principle. Riggs(1980) suggested that when children are encouraged to develop their own motor plan of action, this enables them to cope with the environment in a new and confident manner. Bennett (1980) suggested that carefully planned and presented movement experiences furnish children with an ability to control their bodies and objects in their environment. She stated that "if the teacher provides experiences which allow for exploration and repetition, the chances for improved quality and skill development increases" (p.30).

Although there are a number of considerations that must be taken into account when planning movement experiences for young children, there seems to a great deal of support for adult involvement in the physical play setting. The degree to which intervention can improve or change various aspects of children's movement ability is still in question and therefore more scientific evaluations of this educational approach are needed.

CHAPTER III
METHODS AND PROCEDURES

Introduction

The methods employed in any study rely to a large extent on the initial research question (Kidder,1981). The researcher's primary concern in this study was to observe the effects of adult intervention on the motor behavior of preschool children. It was the researcher's intent to provide the children with a controlled but natural activity setting in which they felt free and confident to move. It was speculated that this physical environment would, in part, encourage natural play behaviors in terms of fundamental motor skills. In order to complete accurate and detailed observations, it was feasible to select one fundamental pattern only. Jumping was selected for the following reasons: a) the movement was simple and easy to detect in a play environment , b) preschool children were capable of executing the rudimentary movement pattern of the jump, and c) there was a large amount of developmental literature pertaining to jumping skills that assisted in the design of the observational checklist (see Appendix A-Checklist)

Research Design

This study was based on an experimental design, identified as a "before-after" research format (Christensen, 1980). Subjects were assigned to a control or experimental group. Both groups were pretested on the dependent variables, which were identified as jumping frequency and variety. The intervention treatment was administered to the experimental

group and both groups were then posttested on the dependent variables. The differences between the pre and post scores from the experimental and control groups were tested statistically to evaluate the effect of the treatment (Christensen,1980). This type of design is noted for an ability to control extraneous factors, such as history and maturation. The random assignment of subjects assures that if maturational factors are prevalent, they will have an equal effect on both groups (Kerlinger, 1973). A relationship between variables would be determined if the experimental group scores were significantly superior to the control group.

Population

The participants were preschool children, ranging from two years six months to five years nine months, all of whom attended the same daycare centre.These age groupings are common to most Canadian daycare facilities in which three to six year olds account for 72% of all children attending, part- or full-time (Fillion, 1989). A total of 19 children (14 females and 5 males) participated in the study. The sample size was restricted somewhat due to the number of children attending the daycare full-time. The number of subjects used by another researcher in two similiar investigations ranged from 24 to 30 children (Wetton, 1980, 1983). An unequal distribution of males versus females is a characteristic of daycare populations, in which females account for 60% of those children attending daycare (Health and Welfare Canada,1984). Information profiles from this study's daycare administration, indicated the subjects were from socio-cultural backgrounds which ranged from middle to mid-upper class levels. Each subject attended the daycare full time (i.e.,8 hours per day, 5

days per week under daycare supervision). Five other children, although present for a number of activity sessions, were not included in the data collection due to their part time status or their departure from the daycare prior to completion of this study.

Regular daily activities in the daycare were planned for two individual groups of children. Children age 2.5 to 3 years were classified as the younger group, and children 4 and up as the older group. Activities for the older and younger children were carried out independently in separate portions of the daycare. However all physical activity sessions were carried out collectively with both groups involved. The children also participated in other physical activities within the weekly schedule, such as swimming and creative dance. The daycare children's regular gymnasium session was substituted for the research project. In the past, the daycare group had been exposed to large gymnastics apparatus twice per week at a nearby facility. These activity periods did not include formal intervention or planned lesson content.

Physical Setting

A large gymnasium space (16.5m by 24.99m) was used to provide a suitable play environment for the subjects involved in this study (See Appendix B- Apparatus). Environmental dimensions were similar to regulations for daycare outdoor fenced-in spaces, and perhaps twice as large as any indoor gross motor environment used in daycare settings (Health and Welfare Canada, 1984). A number of pieces of gymnastics apparatus were set up for each activity session. Apparatus included mats, boxes, trestles, benches, a bar for hanging, a large foam mat, plastic cones,

large wooden shapes (triangle and circle), tire tube and steps. Although most pieces of apparatus were considered multi-functional, the following pieces were selected to elicit jumping in the play environment: the tire tube, benches, boxes, and steps.

The apparatus was pilot tested over two sessions by an external sample of children, aged two to six years. It was important that the apparatus allowed for a wide range of fundamental movements, and that the height and distance of the objects were developmentally appropriate for this age range. These objectives were met and a list of experimental apparatus was determined (see Appendix C-Lesson Plans). The apparatus in the testing environment was arranged according to a predetermined floor plan, also designed by the researcher. Although the same pieces of apparatus were used for each lesson, the spatial patterns and arrangements varied daily (see Appendix C- Lesson plans). The same environment was used by both groups at different times of the morning.

Treatment

The treatment used in this experiment was identified as "intervention". The main objective of the intervention program was to encourage children to become aware of their bodies by moving in a variety of ways. The children's natural reactions and movement behaviors on large apparatus were subjected to comment and guidance from an instructor, so that further movement exploration and experimentation would be enhanced. During each activity session, the instructor used a series of responses that related to how and what the children were doing. This format was developed from similar teaching approaches outlined in

movement education. The role of the instructor was to provide the following types of interaction at various periods throughout the lesson:

> 1) to be present in the gymnastics environment and to observe the movement behavior of each child randomly,
> 2) to direct open-ended questions to the children about their movement(s) as they occurred,
> 3) to reinforce and confirm the responses given by the children and to motivate and praise their efforts, and
> 4) to verbally challenge the children to repeat the movement(s) or to find other variations of the activity.

In this study, the experimental group was involved in ten gymnastics sessions, in which the researcher acted as the instructor, supplying interactions. Each lesson was based on a particular movement theme, associated with what, where, and how the body moves (Kruger & Kruger,1982). Themes were based on the four main components of movement, " the body representing the instrument of action, space into which movement is projected, the effort quality with which it is executed and the body's relationship to objects or people in the environment" (Stanley, 1969). These main themes were divided into smaller subthemes or movement concepts, which provided direction and focus within the daily lesson program. For example, a lesson theme associated with Body, may have involved the awareness of body shapes. The instructor's verbal comments for that particular lesson involved terms associated with the lesson theme such as stretch, curl, twist, or wide shapes. These comments served to emphasize a specific aspect of the children's movement behavior, over a wide range of fundamental movement patterns.

The actual methods used by the instructor were specifically related to the overall objectives of the program. For example,

> a) the instructor observed the child's movement behavior first, before making any verbal comments, in order to understand the child's choice and to formulate an open question that would help the children expand upon the activity;
> b) the instructor's interactions allowed for both verbal and physical input by the children. Each child's understanding of what they were doing and how they were doing it, was thought to heighten their attention and awareness;
> c) the instructor's praise and recognition was used to increase the confidence of the child, so that movement patterns were associated with success and positive feelings; and
> d) the instructor also used verbal statements to challenge the children to modify the activity. This required some planning and problem solving measures on the part of each learner.

Four main types of verbal guidance were used: open questions, challenges, recognition statements and positive feedback. These methods were related to the overall objective of the intervention program. For example,

> a) when the children displayed a particular movement, a number of times, they were asked to find another way of doing the movement or to find ways of linking that movement with another, i.e., open question;
> b) as the children displayed a certain movement, they were encouraged to bring attention to a particular aspect of the movement and challenged to modify it in some way, i.e., use of a challenge statement;

c) when the children displayed a new, or different way of moving, this behavior was described and associated with movement terminology, i.e., recognition statement; and
d) when the children completed a particular movement, this was positively reinforced and directly associated with a particular aspect of the movement, i.e.,"What a beautiful stretch Mary, your toes were really pointed".

The intervention program did not attempt to teach specific or individual skills. The basic assumption behind the intervention methodology was that if children were verbally guided according to movement themes on large apparatus, movements would be performed with more variety, more often. It was assumed that the treatment program would enrich the children's movement ability regarding variety and frequency over a range of movement patterns. Therefore, these general improvements could be identified for specific movements, such as jumping.

Observation

The sampling technique used for observation in this study was identified as event sampling. (Kerlinger, 1973). Event sampling involved the select observation of a specific behavior or event occuring in a natural setting. In other words, the observer waited for the specific behavior to occur under the conditions given. The result was a frequency count of the target behaviors. Event sampling was utilized in this study to measure the specific behavior of jumping and to measure this behavior within a time frame observed in the free play environment.

Observers

The observers involved in this study were three undergraduate students, enrolled in a movement education course at a community college. The observation team underwent a total of five hours of training. The research format and checklist terms were discussed in detail. After group discussion, the written format of the checklist was changed slightly to allow for easier visual tracking and writing space. The observers also participated in a number of practical sessions in which they became familiar with recording procedures. Alternative daycare samples were used for observer training. Three practical sessions were required in order to establish inter-event and inter-rater reliability values. The researcher acted as the master observer and timer for data collection.

Instrumentation

A checklist specific to jumping behaviors was developed for this study by the researcher (see Appendix A-Checklist). Informal pilot data were collected on the jumping behaviors of preschool children in three activity sessions of a movement program designed for children aged two to six years. Before the checklist format could be developed it was necessary to become familiar with the type and characteristics of jumping behaviors exhibited by children in a large apparatus environment. In addition to practical observations, the researcher evaluated developmental literature pertaining to jumping skills (Hellebrandt, Rarick, Glassow & Carns 1961, Wickstrom,1977; Williams, 1983). The terminology for each jumping characteristic was examined several times by an expert in the area of motor development. A list of twenty jumping characteristics was developed to

identify jumping variety and each term was defined for use by the observers (see Appendix A- checklist).

The first draft of the checklist was used in two 30-minute sessions involving a sample group of daycare children. Three external observers trained in early childhood programming found the checklist permitted immediate and accurate recording and did not interfere with their ability to track the children's movements (Saslow, 1982). The checklist format was then prepared for interrater use and the experimental process.

Reliability

Reliability refers to the degree of consistency of results obtained by a measuring instrument upon repeated application (Meyers & Blesh, 1962). In order to determine the reliability of the testing instrument in this study (i.e., the checklist), a number of observational sessions were required using an external group of daycare children. One designated child was observed by all rater/observers and tracked for a period of five minutes. Sufficient time was needed in order to view the wide range of jump characteristics in the proposed study, and therefore several subjects were viewed in this manner. Before inter-rater reliability scores could be analyzed, it was necessary to determine inter-observer agreement on event occurrence.

Due to the nature of the sampling technique it may not always have been possible for the observers to see each and every jump. During their brief moments of recording, i.e., head down writing, it was possible that a jump (occurring in 3-4 seconds) may have been unobserved. Inter-rater event occurrence was determined by comparing the order of jumps with a master rater. The number of agreements and disagreements between the

raters themselves and between raters and the master rater were calculated. The jumps that were unobserved by the rater were considered an error. Calculated event occurence proved to be high among the raters, at .92. This meant that 92% of the time, observers saw the same jump at the same time. Inter-rater reliability on the jumps observed was then calculated and also proved to be high at .91. Correlations at levels of from .90 to .99 have been considered highly acceptable for observational analysis (Meyers & Blesh,1961).

Procedures for Data Collection and Recording

Data was collected for both sample groups in the same manner for pre and posttesting. Two sessions were used for pretesting as well as posttesting (10 minute totals for each child were gathered in this time). The observers were randomly assigned three or four subjects daily. All the children were observed for pre- and posttest sessions. The free play sessions took place over 30 minutes. Five minutes were assigned to observe each child, with a one minute organizational period between subjects. This allowed the observers to find the next subject and begin a new checklist sheet.

Three observers and one head timer were seated in separate corners of the play environment, an equal distance apart (see Appendix C-Lesson plans). The observers were situated well back from the play apparatus, allowing for an unobstructed view of the entire gymnasium. Each child was observed in a continuous manner for a 5 minute period in two separate activity sessions (i.e., 2 sessions X 5 minutes per session=10 minutes per child).

During each observation session the raters immediately recorded each time a child displayed a jumping action, within the designated time period. All jumping behaviors were recorded on the uniform checklist. Each observational period was controlled by a head timer, using a stopwatch. The observers were notified when to begin or end each five minute session. This was done with a single verbal cue: start or stop.

Treatment of the Data

Pre-and posttest data were treated in the same manner. Raw scores for each child were determined for two 5-minute sessions for a total of10 minutes per child. The session totals for the number of jumps were averaged over the two days of testing. Mean scores for frequency were based the total number of jumps displayed by each child. Mean totals for variety were based on the number of jumping characteristics utilitzed in each child's movements. Scores were also calculated to acheive a score for variety of jumps and frequency of jumps. Statistical analysis initially involved T-tests to determine if the two groups were similar. Pre- and post results were later analyzed with an Analysis of Variance (ANOVAS) on repeated measures.

Validity of Research Project

There are two standards of "truth" against which research is judged: internal and external validity (Saslow, 1982). The internal validity of this study was measured by determining the degree to which intervention (IV) was related to changes in jumping behavior (DV). In order to determine the strength of this relationship, it was necessary to identify and control

other extraneous factors that might pose a threat. Therefore by reducing the confounding variables in this study, it was more acceptable to assume that a relationship between intervention and jumping frequency and variety did or did not exist. The following factors may have posed a threat to the internal validity of this study, and therefore steps were taken to reduce these factors.

Internal Validity

1. Maturation

It was reasonable to assume that preschool children would undergo some degree of physical or psychological change that may affect their movement capabilites. The only way to separate a major "testing effect" from maturational factors was for the experimental group scores to rate over and above the changes in the control group. Maturational factors were minimized by establishing a base line for the two samples. By comparing pretest data scores it was possible to establish the equality of both groups before treatment. In this way, if both groups started out equally, maturational factors would have an equal effect on control and experimental samples (Kidder,1981; Saslow,1982).

2. History:

Due to the nature of this study, some children may have had more experience with a gymnasium setting than others. This may account for major differences in ability. As in the case of maturation, the factor of history was controlled by determining the level of ability of each child

through pretest data information. In this case the sample appeared very homogeneous. It was also noted that prior to the study, the daycare children participated twice weekly on large gymnastics apparatus together as a group. Therefore their past experience may have been equal in this regard.

3. Instrumentation

In order for this investigation to be internally valid there had to be a reliable testing instrument involved. Measuring tools are not as reliable when the observers become biased or change in the manner in which they have rated a particular subject. These two factors have been identified as observer bias and observer drift (Kidder, 1981). In this study, great care was taken to define the various terms used on the checklist instrument to prevent any misinterpretations on the part of the observer. Observer bias was partially reduced by not involving the observers in any part of the experiment, other than pre and posttesting sessions. The observers were not informed specifically about what kind of treatment would be applied between testing sessions therefore reducing any personal views on the effects of the study.

4. Loss of Subjects

Although investigations often begin with equal-sized groups that are equivalent on variables such as age and gender, some subjects may be lost to unforeseen circumstance (Saslow,1982). In this study, attempts were made to control for this factor by selecting subjects that were considered to have full-time status at the daycare from families that did not plan to leave

or relocate for the period of the study. This was important information to establish at the beginning of the study due to the fairly small sample size concerned. Those children who were absent for several activity sessions or dropped out were not included in the results of this study. The original sample began with twelve children in each group. Final data analysis involved ten children in the experimental group and nine children in the control sample.

5. Sensitivity or Reactivity

Subjects who are exposed to a new environment often need sufficient time to become more at ease and less aware of being observed. In order to reduce sensitive behavior in this study, pre-test and posttest data was collected over a one week period in two separate sessions. Sensitive behaviors may also have been less dramatic for this particular sample due to the fact that the group was familiar with the gymnasium, as well as adult caregiver supervision and observation during activity time. These occurrences were specific to this sample and were unplanned by the researcher.

External Validity

The external validity of a study represents how well the results of an experiment can be generalized to a new situation. High external validity allows the researcher to make accurate predictions beyond the narrow confines of the original experiment (Saslow, 1982). In order to establish the degree to which this particular study could be generalized, a number of variables were identified in terms of their threat to external validity.

1. Population Validity

Generalizations would be restricted if the sample did not represent the target population from which it was taken. The subjects in this study ranged in ages from two to five years of age which made it acceptable to generalize the results to children identified as preschoolers. It was considered more appropriate to use this wider age range than to restrict the sample to one particular age group. In the natural daycare setting, children from two to five are involved in a wide range of communal activities.

A second significant factor in relation to the population deals with the sample and its orientation to other daycare facilities. Due to the lack of regulatory procedures and standards from one type of daycare to another, it may be difficult to transpose these experimental results to all children under daycare supervision. This daycare sample was representative of a number of similar government subsidized operations within the Alberta daycare system.

2. Conditions of the Environment

It was the researcher's intent to design an activity setting that would be similar to one found in a daycare setting. The play setting was developed with common forms of large apparatus such as benches, ladders, climbing equipment and boxes. Although the activity space was larger than most indoor play spaces, it was similar to outdoor environments used by daycare centres. The realistic nature of the testing environment increased the generalizability of the experiment to real-life daycare experiences.This

would be especially true for those daycare centres which may have access to school or community gymnasiums.

3. Operational Definition of the Independant Variable

In this study, the independent variable was identified as "intervention". In order to define clearly the treatment program, it was necessary to outline the role of the adult, the content of the program and the communication stategies within this method. Due to the broad nature of movement education concepts and methods, this instructional technique may generalize to a number of similar activity programs with the same age sample (i.e., providing the treatment is carried out in the same manner outlined in this study).

4. Generalizations of the Dependent Variable

Although the intervention program used in this study encouraged a wide range of fundamental motor patterns, jumping was used as the specific measurement variable in relation to frequency and variety. The ability of the researcher to generalize these results to all other movement behaviors is somewhat reduced.

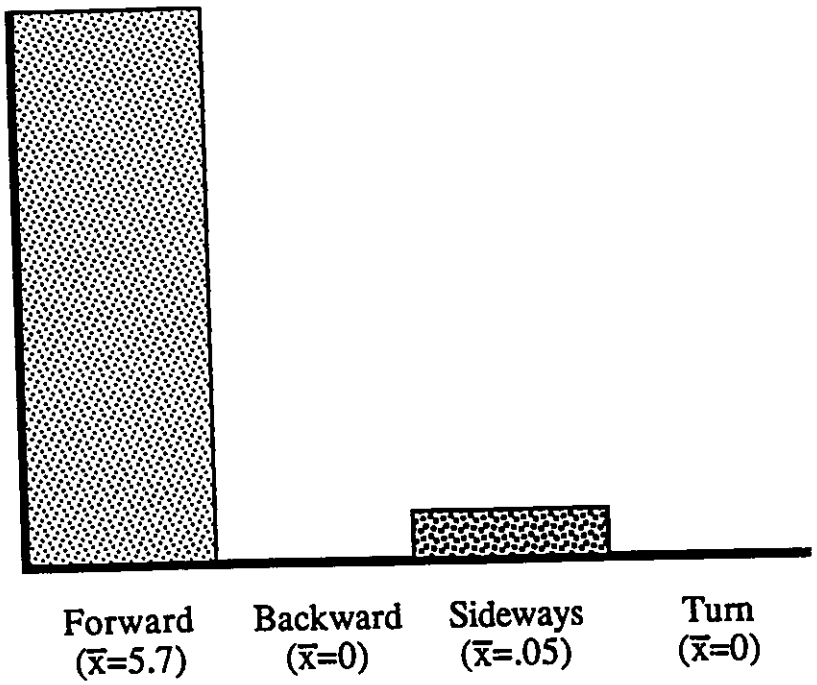
CHAPTER IV
RESULTS

The primary purpose of this study was to evaluate the effects of an intervention program on the jumping behaviors of preschool children. In order to address this main question, it was important to analyze the frequency and variety of jumping, before as well as after treatment. The frequency variable represented the number of jumps the children performed. The variety variable represented a type of jumping characteristic, such as "down", "on", and "curl". Comparisions were made between pre and posttest mean totals for both variety and frequency. Analysis employed in this study included an Analysis of Variance (ANOVA) with repeated measures for total frequency and variety values, and a descriptive evaluation of jumping behavior.

Descriptive Analysis on Preschool Jumping Behavior

The data in this study revealed some apparent trends in terms of the nature and use of jumping behaviors on large apparatus. For example, preschool children used jumping as a functional movement, which was described as moving from two feet, in a natural body position. Figure 1. illustrates the variety of jumping movements related to the direction of the body; such as, forward, backward, sideways and turn. The preschool children in this study used more forward jumping movements than backwards, sideways or turning.

Figure 1.

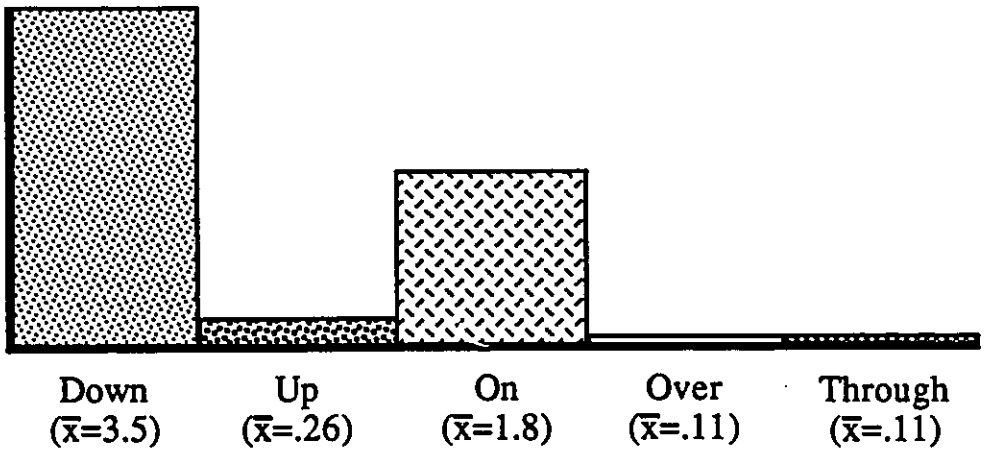


Comparisons of Jumping Variety in Terms of Body Direction

Jumping in a backwards direction or with a turning motion, was not noted during the observation periods throughtout the pretesting. The children used sideways jumping only when they dismounted a particular piece of the large apparatus, i.e. a low bench or box.

Figure 2 illustrates those jump characteristics which involve direction in relation to the apparatus. These jump characteristics include "down", "up", "on", "over", and "through". The most common jumping movement displayed during the pretest observation period were jumps in a downward direction (x=3.5).

Figure 2.

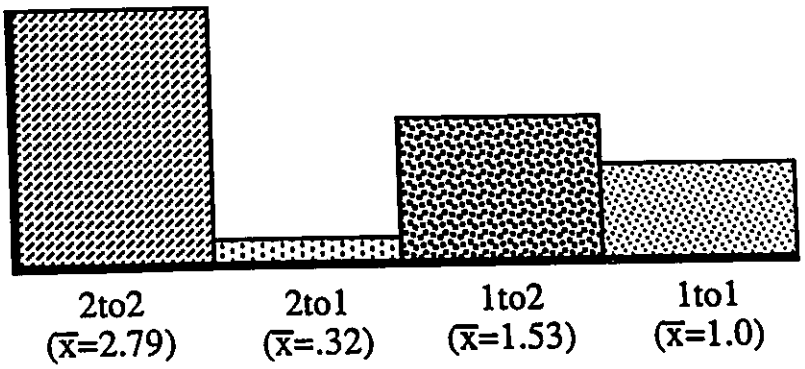


Comparisons of Jumping Variety in Terms of Direction to Apparatus

Jumps displayed in a downward direction were often used by the children to dismount a particular apparatus, such as the wooden boxes, low benches and the climber. Jumping which involved upward movements were not used to the same degree as downward. Jumping up was used to mount a piece of gymnastics apparatus. Instead of jumping upward, several children in the sample, placed the middle of their bodies against an object such as a wooden box/bench and pulled themselves upward with their arms (this was not considered a jumping action). The mean scores for jumping over and jumping through objects, were the least common movements in relation to direction. If the children jumped over or through an object without knocking it over, the movement was repeated again, at least once.

Figure 3 illustrates the use of jumping characteristics related to foot position. Most children would begin and complete a jumping action from a more stable body position such as two to two feet.

Figure 3.

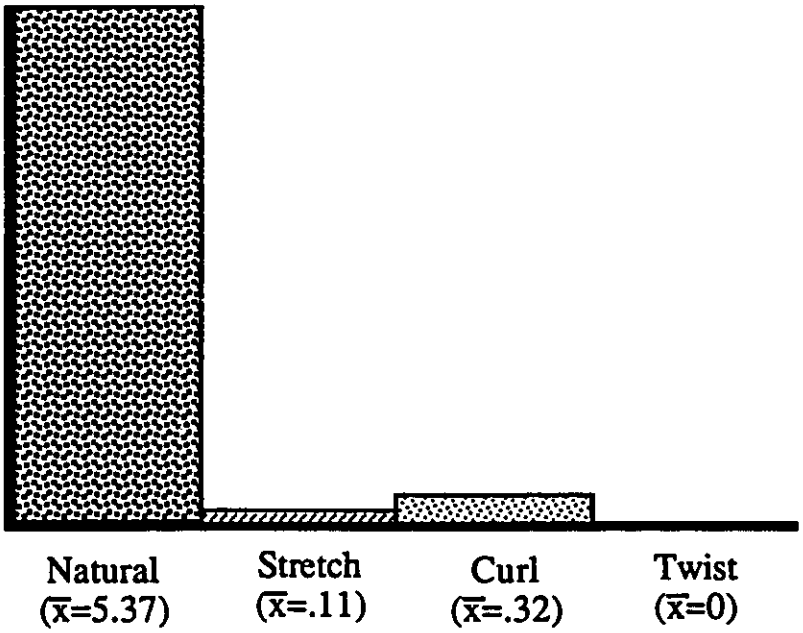


Mean Scores for Variety: Foot Positions

It was more common for children in this study, to land on two feet to complete a jump i.e. 2 to 2 feet and 1 to 2. Jumps that involved landing on one foot were not common. The children in this study used one foot landing when dismounting low objects such as the wooden benches and when travelling through the wooden shapes. One to one foot jumps could be described as a large stepping action.

Figure 4 illustrates the mean values for variety associated with body shape. The researcher observed that most children in this sample displayed natural body shapes when jumping off and on apparatus. Body shapes such as a curl were used when jumping over a particular piece of apparatus such as the cones and ropes.

Figure 4.

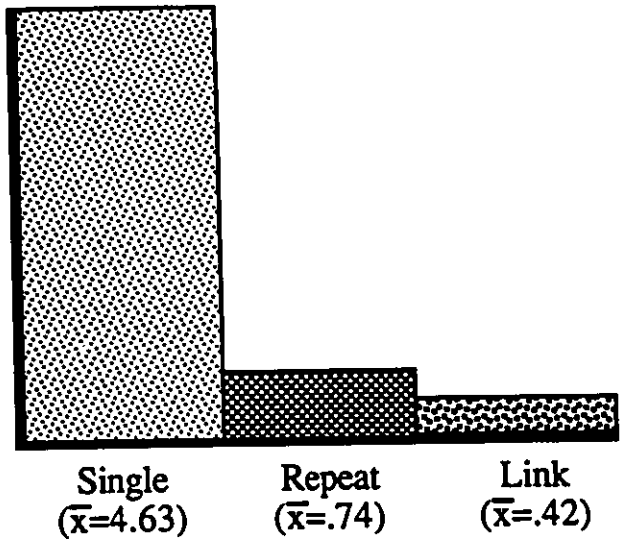


Mean Scores for Variety: Body Shapes

During pretest observations the children in this study did not make use of jumps in which the body was twisted. Most chilren when jumping, maintained a natural body shape, i.e. without a very definite change in body position. Body shapes such as the curl were used more often than stretched or twisted shapes.

Figure 5 illustrates the final three jumping characteristics involved in this study. These jumps were analyzed in relation to repetition and the linking of jumps to other movements.

Figure 5.



Mean Scores for Variety: Repetition of Jumping Movement

The jumping patterns of this preschool sample, related to repeating the same jump, or linking a jumping movement to another were not as common as the use of a single jump. The researcher noted that the children would complete a single jump and then use a locomotor pattern, such as running to then begin another activity. Jumps were repeated one after another on particular pieces of the equipment, such as the jumping pad and benches. The least common pattern was the child's ability to use the jump as a link or connecting motion to a new movement,such as a roll or balance.

The children in this study used single jumps as a means of dismounting apparatus and moving quickly throughout the gymnasium space. The researcher noted that several children enjoyed the stimulation of jumping up and down as a repetitive behavior. Repeated jumps were

commonly observed on soft apparatus such as large foam mats and the jumping pad (covered tire tube).

A review of the data from Figures 1-5 indicated that the most common jumping characteristics were: down jumps (3.47), two to two feet (2.79), natural jumps (5.47), and single jumps (4.36) per child. The children during the pre-test observation period utilized jumping as a means of moving form one piece of apparatus to another or as a locomotor activity. The least common jump behaviors were backward,turn, through, over, 2 to 1, twist and link.

In terms of jumping variety, the children during the pre-observation, utilized just over 50% of the total jumping characteristics outlined in this study. The total mean average for jumping variety in pre-test data collection was determined at 9.32. This value indicated that the total sample demonstrated an average of 9 different jump characteristics out of the possible 20.

Pre-testing data regarding the frequency of jumps was also recorded. The children in this study used an average of 5.79 jumps over an observational period of ten minutes. Approximately one jump was observed for every two minutes of activity. Both the frequency and variety mean scores were also analyzed for trends relating to age factors and gender, in which independent t-tests were used. This analysis did not reveal any apparent differences between older and younger children in the sample, or differences between males and females. the formal group sample did not differ to any significant degree in terms of the number of jumps and the type of jump characteristics utilized on large gymnastics apparatus.

Results: Frequency Data Analysis Pre and Posttest

Table 1 contains mean frequency scores of each of the two sample groups (A control group=5.4 and B experimental=6.1) during the pretest. Posttest scores were 5.8 (control) and 7.5 (experimental).

Table 1
Jumping Frequency: Mean Scores

Repeated mea..	PRE TOTAL	POST TOTAL	TOTALS
CONTROL	9 5.44	9 5.88	18 5.66
EXPERIMENTAL	10 6.10	10 7.5	20 6.8
TOTALS	19 5.78	19 6.73	38 6.26

These figures describe the average number of jumps exhibited by the control and experimental groups, over a ten minute period of observation. the differences between the two group means (.656) indicated that no significant differences were present between the samples related to frequency before the treatment was applied. A two way ANOVA with repeated measures revealed no significant main effects (F=.487 and F=1.46) (see Table 2). The F value for interaction was .37 indicating that no significant interaction of treatment and repeated measures.

Table 2

Analysis of Variance on Jumping Frequency

Group	df:	Mean square:	F-test:
Group (A)	1	12.16	.487
subjects w.groups	17	25.01	--
Repeated Meas.(B)	1	8.52	1.46
AB	1	2.16	.37

Intervention therefore did not significantly affect the jumping frequency of the experimental group. Slight changes in total mean scores were noted for both groups; however the abscence of a main effect for this factor indicated that this change was not significant. The experimental group jumped approximately 1.5 to 2 times more than the control group on average but the frequencies were too low to show differences due to group or treatment.

Results: Variety Data Analysis Pre and Posttest

Table 3 contains pretest and posttest mean scores for the control and experimental groups. The mean scores represent the average number of jump characteristics for each group. This was based on a possible score of 20, which was the total number of jump characteristics measured in this study.

Table 3

Jumping Variety: Mean Scores

Repeated meas.	PRE TOTAL	POST TOTAL	TOTALS
CONTROL	9 7.44	9 8.33	18 7.88
EXPERIMENTAL	10 8.7	10 10.2	20 9.45
TOTALS	19 8.10	19 9.31	38 8.71

The control group used an average of 7 types of jumps (7.44) in the pre-observational setting. The experimental group used approximately 8-9 types of jumps (8.7), before the intervention program was implemented. A two way ANOVA with repeated measures revealed no significant main effect (F=2.81 and F=3.65) (see Table 4).

Table 4

Analysis of Variance on Jumping Variety

Group	df	Mean Square	F -test
Group (A)	1	23.08	2.81
Subjects w. group	17	8.19	——
Repeated Meas.(B)	1	13.92	3.65
AB	1	.885	.232

The F value for interaction was .232 indicating that no significant interaction was present in relation to treatment and repeated measures. Intervention did not appear to affect the number of jumping characteristics that were used by the experimental group. These results are discussed in more detail in next chapter.

CHAPTER V
DISCUSSION

Jumping Frequency

The results for this study indicated that intervention did not significantly effect the frequency of children's jumping behavior on large apparatus. There were slight increases in both the experimental and control groups in relation to frequency, however not enough to rate the experimental group superior. For example, the experimental group increased the number of jumps by 1.4 and the control group increased the number of jumps by .4 . The differences between the experimental and the control group were not enough to justify concluding that these were effects of intervention for frequency. In other words, the children who received the intervention treatment did not jump more often than those children who were allowed free play periods on the same apparatus.

Jumping Variety

Pretesting data regarding variety, for both the experimental and control group, revealed that jumping behaviors could be described as highly functional. Both groups of children in this particular study used jumping mostly for the purpose of dismounting various pieces of apparatus. For example, the most common jumping variations included jumps that moved downward, in a forward direction, landing on two feet, in a natural position, and as a single event. The experimental group displayed 8.7 jump variations before treatment, while the control group displayed 7.4, a difference of 1.26 jumps. In this study, there were a total

of twenty jumping variations analyzed. As mentioned earlier in the results of this study, the two sample groups displayed less than half the jumping variations analyzed, before treatment.

Statistical analysis of posttest variety scores revealed that the experimental group did not differ from the control group, in regards to variety scores. This was represented in the F score and probability values from the Analysis of Variance. These results indicated that intervention did not effect the variety of jumps displayed by the experimental group. A practical evaluation of these results indicated that intervention did not seem to evoke a change in variety behavior, and differences were very small. For example, posttest mean scores revealed that the experimental group displayed 10.2 jumps and the control group displayed 8.33 jumps (mean difference of 1.87). When the mean differences from pre and post testing were compared, for the two groups the difference was only .61.
In reality, the experimental group only displayed a change equivalent to one more jumping characteristics than the control group. The goal of the intervention program in terms of variety, was to encourage children to expand upon fundamental patterns such as jumping, and to begin to utilize different ways of moving. Statisical analysis revealed that this goal was not accomplished through the intervention program. The degree to which intervention effected variety of movement was substantially less than was predicted by the researcher.

The results of this study may also in some way reflect an estimate of the effects of intervention, based on the type of statistical methods employed. The use of parametric measures was justified in terms of the power of these measures to represent changes between two individual

groups, using interval data. A limitation for these types of measures, however, involves the normal distribution of the population. Although the sample in this study was not considered highly abnormal from the parent population, the sample size may have limited the degree of intervention effects. Therefore the results of this study may be described as a approximation of the effects of the intervention treatment. Perhaps, differences between the control and experimental sample would have increased with adjustments made to the overall design, for example, sample size.

Sample Size

Common factors for determining the number of subjects in any study have been outlined by Christensen(1980), Cowles (1974) and Kerlinger (1973). Non-statistical guidelines for sample size selection have been based on considerations such as cost, the samples used in the past by other researchers and pre-event estimates regarding the power or sensitivity of the experiment (Keppel, 1982). A common rule of thumb appears to be, the larger the sample size the smaller the error (Simon, 1978).

For this particular investigation, the researcher was somewhat restricted regarding the availability of a daycare facility with an adequate population of 2 to 5 year old children. The original sample for this particular study was a total of 24 children (n=12 per group). Three children left the daycare before the end of the experimental period and two other children could not be included due to their low attendance rate at the daycare. Data analysis was completed for a total sample of 19 children (9 control, 10 experimental). This sample size has been considered small

compared to those outlined by Cowles (1974). Previous research studies involving preschoolers have also used small samples. For example, Partridge, Gehlbach and Marx (1987) used 6 five-year old subjects to determine prosocial play contingencies in a physical play environment. Karlsson and Ellis (1972) used samples of 8 and 19 to determine height preferences on large apparatus, while others used samples of 12 children for evaluations of play behavior on large indoor and outdoor equipment (Thompson, 1976, Wetton, 1983). Other research investigations which have focused on treatment effects have used larger sample sizes ranging from 20 to 31 and 33 respectively (O'Brien & Nagle, 1987; Butcher & Eaton, 1988; Johnson, 1935).

Research design specialists suggest that based on considerations of statistical power, a level of significance of .05 and the strength of the relationship between the independent and dependent variable, sample sizes of 35 subjects or more should be used (Cowles, 1974). Due to the number of children in one particular daycare facility, samples would have needed to be drawn from more than one facility alone. But restrictions due to the amount of equipment, space and number of observer/raters available limited the use of additional facilities. The researcher speculated that the power of the dependent and independent variables would be sensitive enough to perhaps counterbalance some of the error created by the smaller sample size. The final outcome of the study, however revealed that a larger sample may have been required to detect changes and treatment effects due to intervention. A larger sample selection may have also counteracted dropout and poor attendance factors.

In addition to sample size, the effects of the intervention treatment may have been influenced by other factors in the overall design of the study and features of the actual treatment itself. These are mentioned in the remaining portion of this discussion.

Duration of the Treatment

The results of this study may have been influenced by the duration of the treatment. Perhaps 300 minutes of intervention treatment, over ten lessons, was not enough time to allow for significant changes in jumping behavior to take place. A number of research studies which have involved specific intervention methods have ranged in duration from one particular design to another. Halverson, Roberton, Safrit and Roberts (1977) alloted kindergarten children 120 minutes of intervention (guided practice) and found no significant changes in motor behavior. Sharpe (1979) provided 200 minutes of intervention involving movement education content and methods in order to monitor changes in cognitive development. Others such as Booth (1985), found that children improved their movement ability over 48 lessons (2880 minutes involving instruction in movement education principles). An even longer duration was used by Miller (1978) in which intervention was provided over a 28 month program. No specific time requirements for this type of research has been established, which has made design estimates difficult.

For this particular study, the researcher found it more feasible to apply intervention treatments that would reflect a realistic program setting. Therefore, ten lessons, each 30 minutes in duration, were modelled after recommendations outlined by preschool gymnastic programs such as the

YMCA (1981) and those outlined by Carson (1982). The researcher can only speculate that a longer time period may have suited a wider range of developmental levels and allowed for the children to become more confident with the intervention format. Booth (1985) commented that,

> a child's time is different to an adult's time schedule . . . Children follow courses of change at different rates, therefore it is not always possible to chart exact time frames for specific attainments, especially when external influences are involved. (p.29)

Floor Plan Adjustments

The final results of this study may have been confounded by frequent changes in the actual apparatus floor plans used by the children. For each of the ten lessons, the gymnastics apparatus was rearranged slightly (see Appendix C- Lesson plans). The researcher's intent was to ensure a reasonable level of motivation for both groups of children. Movement specialists have indicated that apparatus should match the objectives of a particular movement theme, and that some changes and additions to the apparatus may decrease levels of boredom, or inactivity (Hick, 1979; Logsdon, 1977; Riggs, 1980; Staniford, 1982). These educators did not indicate the amount or degree of change that should occur, or the frequency of apparatus adjustment.

Other educators have pointed out that a lack of opportunity to repeat movement behaviors on the same piece of apparatus from one play period to the next, may result in reduced levels of mastery and confidence

(Halverson, 1966). Therefore, changes in the environment must suit the particular group of children involved.

Some children may need more than one play period to form a basis for a new movement pattern on a specific arrangement of the equipment. In this case, daily changes in apparatus position may have caused too much variablity when compounded with the teaching intervention. It may be reasonable to speculate that each time the children participated in a new lesson, they spent the first portion of the lesson in an exploratory mode, familiarizing themselves once more with the apparatus environment (Gensemer, 1979). This process may have reduced valuable advancements in movement ability in terms of repetition and confidence. The children may have established a movement pattern from the last lesson, and yet that particular piece of apparatus now served a different function due to its new location, angle or relationship with other pieces of apparatus. Perhaps less frequent changes in the arrangement would have been more suitable.

Post-test Session

It may be feasible that the experimental group in this study became accustomed to the presence of the adult instructor and her constant attention and response to the children's movement patterns in the large apparatus area, and were confused by her sudden lack of involvement in the posttest sessions. Posttest analysis was completed in the play session immediately following the last intervention session. A change from the instructor's presence to no instructor involvement, may have affected the posttest data to some degree. The children may have needed a re-adjustment period, in which to cope with the absence of adult interaction

once again. Educators such as Mitchell (1973), Caplan and Caplan (1974) and Hodgkins (1985) indicate that children often need time to adjust to changes in the learning environment, or to re-establish their own control over the environment. Caplan and Caplan (1974) have suggested that at certain periods of development, the adult's influence is extremely critical.

Perhaps the sudden exclusion of the adult instructor was met with a surplus of undirected energy on the part of the children involved in the experimental setting. The children may have needed time to re-introduce themselves to the environment and their own self-directed behaviors, without reinforcement or feedback. Perhaps a more accurate assessment of jumping behavior would have been noted, proceeding one or two sessions of re-entry into the free play testing environment.

Intervention Program

The intervention program was to promote child-centered movement choices for a number of fundamental movement patterns. The adult's intervention practices were described as generalized for all motor functions. Of central importance to the intervention program was the adult's ability to interact in a verbal manner with the children. The select dependent variable, (jumping) was very specific in nature. The relationship between the treatment and specific measures of jumping may have been too far removed. In order to strengthen the relationship between the independent and dependent variables, the intervention program itself may have required some alteration. For example, if the intervention program had focused some portion of each daily lesson on jumping specifically, perhaps the children would have been more likely to exhibit these

behaviors more often and with an greater variety. This may have been accomplished if the instructor had made more frequent interventions on jumping, with an emphasis on open questions and recognition directed at this behavior. The researcher's initial purpose was to apply general interaction sessions that would evoke change in all areas of movement, including jumping.

The logical assumption drawn from the final results of this study however, indicated that the methods of intervention may have involved too much variability. The children's attention to a wide range of fundamental patterns each day may not have allowed enough opportunity to apply certain concepts such as direction and body shape to specific modes of jumping movements. The children in the experimental group may have required repetition for certain jump characteristics and sufficient opportunity to practice these movements. Logsdon (1977) states:

> Repetition that allows children to assimulate a certain movement and various ways of using that movement, should be encouraged, before challenging them to produce a variety of movement. (p.28)

Motor development specialists such as Schmidt (1977) and Moxley (1979) have outlined the importance of practice and moderate changes in the learning environment to enhance movement ability. Schmidt (1977) has suggested that the response specifications for one fundamental pattern may be different from these. A treatment or instructional lesson that requires the learner (child) to focus on more than one class of movement behaviors

may not be as valuable as one providing a certain degree of variability on one specific fundamental pattern.

In a practical sense, this information may suggest that movement experiences should be designed to focus on one fundamental pattern, in relation to a number of movement concepts, or that more time is needed on each movement theme, in order for children to fully incorporate the main movement principles into their own personal movement behaviors. Perhaps the intervention program used in this particular study would have produced more significant changes in jumping behavior if a certain portion of every gymnastics lesson had been directed towards various jumping characteristics. This may have been accomplished by way of open questions and a higher degree of recognition for such movement patterns.

Observations of the Experimental Group During Treatment

As mentioned earlier in this discussion, statistical findings in this study did not reflect significant changes in the proposed dependent variable in terms of frequency. In this observational study, the researcher did, however, note specific behaviors during the treatment program, which may have been related to the intervention program. Certain changes were observed in the experimental group which were external to the dependent variable. The researcher noted and recorded a number of behavioral changes that were not a part of the actual study. An informal discussion of two of these main observations may be useful for future studies in this area: 1) verbal involvement and 2) equipment utilization.

Verbal Involvement by the Experimental Sample

An interesting observation over the course of the treatment program involved the children's own ability to verbalize their movement plans. For example the children used words and terms to describe what they intended to do, how they had moved, and what happened. During each lesson the instructor recorded all her own verbalizations, as well as some auditory data from the preschoolers in the experimental group lessons. The children in the experimental group were encouraged during certain portions of the lesson to identify their own movement(s) in a verbal or physical manner. The instructor asked open-ended question to focus the children's attention on their own movements, such as, "What are you doing?" "How did you move?" "What happens when you move?" The children would often reply with descriptive word phrases which were related to the content of the particular lesson. The children in the first few lessons of the program seemed unsure at times how to describe their movement behavior. As the lessons progressed there was a marked improvement from responses such as: "I don't know." to "I was doing . . ." The children in the experimental group developed a stronger "movement vocabulary", that was demonstrated both physically and verbally. After a number of intervention sessions, the children were able to construct what was identified as a "movement sentence". The children were able to plan their own series of movements (3-4) and verbalize the particular terms for each movement. This often occurred before, during or after the physical execution of the movements themselves. For example, a child would state that he or she was going to climb, then hang and swing. Other children called out movement

sentences as they were engaged in the motor pattern. The children used movement sentences such as "run, climb, jump" and "slide, roll, turn".

Several movement educators have commented on the close relationship between the physical movement patterns of children and their association of verbal output and descriptive phrasing. Logsdon (1977) suggested that intervention programs allow for active knowing on the part of each child, rather than passive reception. The manner in which children move is obviously primary, and yet when movements are matched with verbalizations, children fully engage in active and directed thinking (Logsdon, 1977). Verbal identification of specific movement patterns, body parts and objects in the environment can assist the child in assembling some order out of the environment with self control and purpose (Sutcliffe, Billett and Duncan,1980).

The experimental group of children in this study seemed very interested and challenged by the introduction of movement sentences. This verbal input seemed a natural part of the exploratory process. The children's verbalizations may have reflected some aspects of learning and improvement based on the intervention stategies employed in this study. However, without direct assessment of these events, the researcher was unable to confirm this hypothesis.

The Experimental Group's use of Equipment

Over the course of the ten intervention lessons, the researcher also noted and recorded the experimental children's use of certain pieces of equipment and their general interest in the apparatus (see Appendix C).

Introductory lessons involved a high rate of locomotion such as running. For example, in the first and second lessons several children ran around the equipment. Instructional comments at this time were basically used to guide the children's attention to the apparatus and various ways of using it. As the lessons progressed, the instructor used more challenge statements and higher degrees of positive reinforcement. This was a result of the children demonstrating an increased interest on the apparatus, with less inactivity or chase behaviors. The researcher also noted that the children seemed more satisfied to leave smaller, movable pieces of apparatus in the positions set out by the instructor. They appeared to be more involved with their own movement plan than in building or rearranging equipment pieces. This observation was an important one. The children in this investigation were able to find various ways of moving on the apparatus that were challenging and stimulating without moving or rearranging the equipment provided. Other researchers, such as Frost and Stickland(1978), have noted that when younger children are left to their own devices, they are less likely to participate on stationary structures because of their unilateral function. Children in free play situations are not normally challenged to find alternative uses for large apparatus.

This was not the case for the experimental sample involved in the study outlined in this thesis. The researcher noted that by the later portion of the intervention program, the experimental group's jumping behaviors were noted on a wider range of apparatus than in earlier lessons. The children used three main pieces of apparatus for jumping in lesson one, and by lesson nine, the researcher noted nine pieces of apparatus from which jumps occurred. It may have been possible that exposure to the intervention

program resulted in a more multifunctional use of the apparatus for a number of fundamental movements.

CHAPTER VI
SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Summary

The influence of adult intervention on the frequency and variety of jumping behaviors of preschool children was the central focus of this investigation. The children involved in this study were exposed to large gymnastics apparatus under two conditions: one group received an intervention program, while a second group was exposed to the same apparatus, without intervention. The intervention or treatment program involved a series of ten lessons, each 30 minutes in duration. The lesson content was based on movement education concepts from four major themes: body, space, effort and relationships. The instructor utilized these concepts to highlight various aspects of children's movement. This was achieved through the use of verbal guidance in the form of open question techniques, challenge statements, recognition and positive feedback associated with the lesson's subtheme. The jumping behaviors of both groups were analyzed before and after the treatment program. Statistical analysis of jumping revealed that intervention did not effect frequency, but did influence the variety of jumping behaviors.

Conclusion

The results presented in this study indicated that intervention had no effect on jumping frequency or variety. The intervention program in this study was based on providing a generalized form of treatment that would affect a number of movements, including jumping.

Recommendations

Due to the rather small degree of change found for each one of the dependent variables (frequency and variety), a modified version of this study may be valuable to check (confirm, strengthen or diminish) the findings. The results raise several questions:

1. Could anything in the experimental procedure have diminished or exaggerated the degree of change?
2. Would it be possible to produce a larger gain by modifying the intervention program?
3. More generally, is intervention a worthwhile instructional approach?

The answer to the first question listed above, relates specifically to modifications in experimental procedures. For example, adjustments in the number of subjects used in a future version of this study may have an influence on the overall results. A small sample size often reflects an approximation of the effects of the treatment, because of the higher degree of error involved. For example, particular changes that involve only one or two subjects from within the sample, may dramatically influence the overall results. Larger samples lessen this effect and reduce the possibilty that the treatment effect occurred simply due to chance. Additional subjects are said to strengthen the relationship between the treatment and dependent variable, as these larger groups represent more closely the parent population under investigation. As previously mentioned in the discussion of this experiment, statistical recommendations often involve groups of thiry-five subjects or more. The researcher should be aware that large samples of daycare children may require incorporating more than one

facility in the study. Therefore follow-up designs should also allot for sufficient supplies and perhaps the utilization of daycare workers trained to intervene.

A second proposed change to the present experimental format involves modifications in posttesting following the treatment condition. As discussed in the researcher's lesson plan data (see Appendix C), the behavior of the children in the experimental group during posttest analysis was different than in the intervention setting. The researcher concluded that the children's behavior was confounded by the fact that the instructor was suddenly no longer present in the environment. Follow-up investigations should incorporate a re-entry period in which the children may adapt to the free play, large apparatus setting. Perhaps two or three free play sessions would supply a sufficient re-entry period prior to posttest analysis.

Other modifications to this study pertain to the intervention treatment itself, which may assist in providing an answer to the second question which is, would it be possible to produce a larger gain by modifying the intervention program? For example, the researcher speculated that the effects of intervention may in fact be more evident if the duration of the treatment were increased. A longer treatment period may ensure that the children in the program have sufficient time to become familar with the instructional environment, in terms of exposure to the apparatus and several movement concepts. An increased duration may also give the instructor sufficient amount of time to cover the four main movement themes in far greater detail with progressions. The researcher

has recommended three to four lessons per movement theme, (a total of 12-16 lessons) at minimum.

Another important modification for future research relates to the apparatus and floor plan adjustments. The researcher, reflecting back on the experiment, realized that the arrangement of the apparatus should have remained more constant in order for the children to repeat the same movement on the same piece of apparatus. Perhaps this was one variable that had a direct effect on the frequency of jumps exhibited in the large apparatus setting. Frequency values may have been linked to the amount of opportunity the children had for repeating a particular movement. Therefore, the apparatus environment should not be adjusted for each lesson. Specific arrangements and the spacing of apparatus should be limited. Changes in floor plan should coincide with the four major themes, and therefore only three or four apparatus adjustments may be required. A more consistent activity environment may ensure that various movement behaviors are repeated.

A final modification of this study relates to the generalized approach of the intervention treatment and the more specific measurement condition (jumping). The intervention may have been too broad based, without enough specific attention focused on one fundamental pattern. The movement themes were applied to a great range of movement patterns, and therefore the treatment effects may have been more diversified. The effects of intervention may have been heightened to some degree if a portion of the lesson had been restricted to jumping behaviors only. The researcher suggests that for the purpose of this study, a third of each lesson may be devoted to relating movement concepts to jumping only.

Final Comment

The modifications to this particular study may in fact not only lead to more conclusive evidence that intervention can cause change in variety of movement, but also provide evidence of positive changes in frequency. In order to answer the last question proposed in the beginning of this discussion, is intervention a worthwhile approach?, there will be a need for more research in this area. Observations in realistic and natural play settings can only serve to draw us closer to finding answers to the many questions regarding early motor development and appropriate teaching methods. Follow-up studies may give further support to various forms of intervention and their effects on fundamental motor behaviors.

The area of preschool motor development and the analysis of movement behaviors in young children is open to endless opportunity for those individuals who are interested and concerned about enhancing this portion of the educational process. There is a tremendous need to know more about what young children actually do in terms of movement in various play settings, particular indoor play. Questions which involve the effectiveness of the adult's role in play behaviors are very critical for those children who are involved in daycare, nursery care and even in the home setting. Further investigations regarding the role of the adult in terms of improving and understanding the movement ability of young children is critical in light of increased numbers of children under alternative care. Movement to the child is life. The importance of sound teaching practices for the enrichment of movement behaviors is an essential portion of the educational process. Only through carefully planned research endeavours,

will we truly come closer to understanding the role of movement and the need for sound programming.

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APPENDIX A
CHECKLIST TERMS

The checklist used in this study included twenty terms identified as jump characteristics. Each jump characteristic concerns the relationship to the apparatus, foot position, body shape, direction or the repetition of the movement. These terms were defined in the following way:

A. Relationship to the Apparatus

1. Down: a jump in which the body descends from a piece of apparatus.
2. Up: a jump in which the body is projected upward to mount a piece of apparatus.
3. On: a jump that occurs directly on top of a piece of apparatus.
4. Over: a jump that propels the body over an object with a height objective.
5. Through: a jump that propels the body into and out of an object.

B. Foot Position

1. 2 to 2: a jump that occurs from both feet, landing on both feet.
2. 2 to 1: a jump that occurs from both feet, landing on one foot.
3. 1 to 2: a jump that occurs from one foot, landing on two feet.
4. 1 to1: a jump that begins and lands on the same or opposite foot.

C. Body Shape

1. Natural: a jump in which the body remains in a netural position.
2. Stretch: a jump in which a maximum effort is made to elongate or lengthen the body.
3. Curl: a jump in which the body is in a ball-like shape with the knees close to the chest and arms close to the body.
4. Twist: a jump in which the lower body moves in an opposing direction to the upper body.

D. Direction

1. Forward: a jump in which the frontal plane of the body faces the direction of the intended movement.
2. Backward: a jump in which the dorsal side of the body faces the direction of the intended movement.
3. Sideways: a jump that occurs when one side of the body leads the intended movement.
4. Turn: a jump that changes the direction of the body.

E. Repetition

1. Single: one jump that occurs on its own, without immediate repetition.
2. Repeat: a series of jumps, performed one immediately after another.
3. Link: a jump that is directly linked to another movements (s).

APPENDIX B

Gymnastics Apparatus and Gymnasium Dimensions

Apparatus	Inches	Cm.
1. Yellow Box	17 inches(sq)	43 cm. (sq)
2. Purple Box	25 inches (sq)	65 cm. (sq)
3. Steps	15 inches (high) 17 inches (wide) 6 inch (step)	38 cm. 43 cm. 15 cm.
4. Wooden Triangles	36 inches (per side)	92 cm.
5. Wooden Circle	34 inch (diameter)	86 cm.
6. Large Plastic Cones and Ropes	cone = 17 inches rope height = 11 inches = 13 inches = 15 inches	43 cm. 30 cm. 35 cm. 40 cm.
7. Small Plastic Cones	8.5 inches	21 cm.
8. Red Slant Board	8.75 inches (high) 33 inches (long) 60 º slope	22 cm. 86 cm.
9. Benches	132 inches (long) 13 inches (high)	345 cm. 32 cm.
10. Foamy Mat	104 inches (wide) 151 inches (long)	264 cm. 384 cm.
11. Trestles	small 41 inches (high) large 65 inches (high)	104 cm. 165 cm.
12. Metal bar	80 inches (long)	205 cm.
13. Jumping pad	68 inch (circumference)	172 cm.

14. Mats	1- 2 inch pile(thickness)	2.5-5 cm.
	large 71 inches (long)	182 cm.
	60 inches (wide)	152 cm.
	small	
	152 cm.	60 inches (long)
	121 cm.	48 inches (wide)
Gymnasium Dimensions	82 feet long	24.99 m.
	53 feet wide	16.5 m

APPENDIX C
LESSON PLANS

A lesson plan was prepared for each activity session involving the experimental sample. Each lesson plan served as a general guideline to emphasize movement concepts such as space, direction, body awareness and effort qualities. Apparatus arrangements were planned and designed to ensure that movement opportunites were associated with the lesson theme and lesson objective. The objectives outlined for each lesson were established in broad and general terms to correspond with the children's natural movement choices and a wide array of fundamental patterns.

Although each lesson was unique in terms of events, there were a number of common situations within each activity period. Each day the children entered the gymnasium environment and were encouraged by the instructor to begin immediately. The instructor usually spent the first few minutes of the lesson walking around the apparatus area. This allowed the instructor a short period of time to plan and give comments, open questions and challenges that might help the children review the concepts from the last activity session. After this review period, a new movement theme was introduced.

As the children continued their exploration on the apparatus, the instructor used words which related to the new theme. Comments, questions and challenges which were based on the movement objective were addressed to individual children and the group as a whole.

The instructor attempted to highlight individual movement behaviors with comments such as : " What a wide jump, John," "Who is stretching as

tall as they can?", "How did Mary get all the way up there?" During each activity session, the instructor challenged all the children in the group with two or three statements that would require the children to plan out their movements. These challenge statements eventually helped the children develop movement sentences, incorporating more than one concept. The children often would respond to the challenge statements with comments such as: " That's easy", "Watch me teacher", "Look teacher, look!", and "I can do that, watch."

The instructor attempted to be sensitive to the children and their needs by carefully observing their behavior, before interacting with them. Direct interaction was given immediately after the children had completed a movement, or when there was a pause in the movement. The instructor tried to find natural breaks in which the children were attentive to comments, challenges or questioning procedures. The instructor regularly reinforced movement behavior with positive feedback and praise in the form of a gesture (hand clap, smile) or verbal comment such as, "Excellent Mary, you were really stretched out that time", "Super! What a big jump", or "Your legs where really wide, good for you."

The following information is the instructor's account of each lesson theme and the events which took place during the 10 lesson program. This information was gathered from two sources: a) the researcher's journal notes and b) tape recorded verbalizations collected by the instructor during the actual lesson.

Lesson Plan 1 Experimental Data
Theme 1: Moving from one piece of apparatus to another.

Objective: The children were encouraged to explore the entire gym and the equipment in the area. The instructor placed an emphasis on various ways to travel to and from various apparatus, as well as ways of moving on the apparatus.

Sub Objective: To become familiar with the space between various pieces of apparatus.

Observational Data: The children in today's lesson explored the equipment for the first time after pre-testing. The children came into the experimental area and were active immediately. Most children ran into the free spaces and around the equipment. The children often moved in pairs and sometimes groups of three.The younger children were very attentive to climbing and travelling on the small trestles and wide benches. The older children used the larger trestles and bars mostly for hanging upside down and swinging. A popular activity for the boys was to run and throw themselves down on the large foamy mat, rolling across it. The wooden triangles and skipping ropes and cones were dismantled a number of times and carried or dragged around the play area. The children appeared to like climbing the steps and jumping onto the mat The purple box was used for climbing into, mostly by the younger girls. Three children tried to move the location of two of the boxes.

The behaviors with the highest frequency appeared to be: climbing, swinging, rolling and sliding. The locomotor patterns which occurred between the apparatus space were running or walking. Two instances of a gallop type step were used by girls in the sample group. Jumping was noted most frequently off the small steps, the yellow box and the jumping pad.

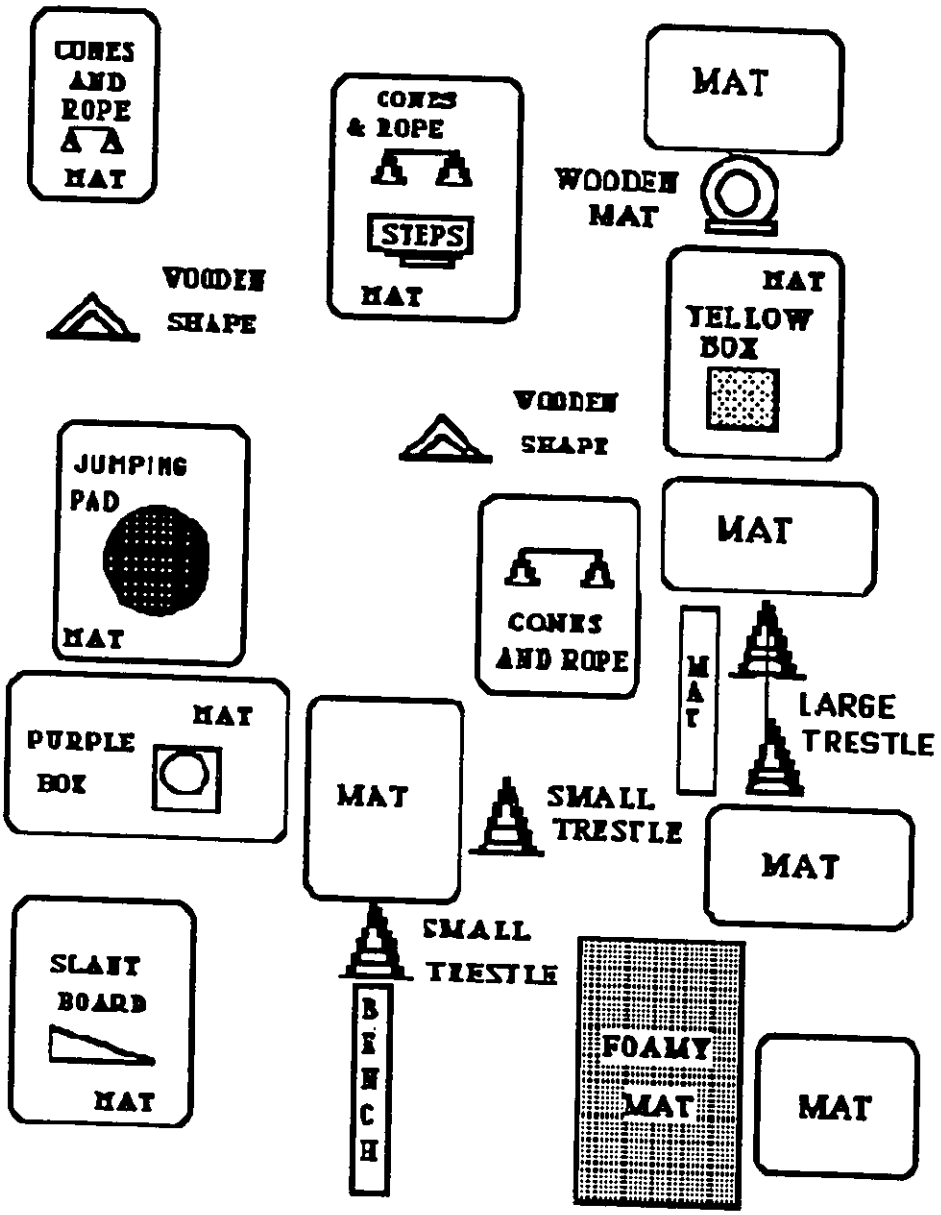
The instructor used the following key phrases to encourage travelling from one piece of apparatus to another: "How did you get there?", "How can you move?", "Can you go somewhere else now?", "Can you find something new to travel on?", "Let's find a place to go", "Try your best to use each piece of the apparatus", "Can you find all the mats in

the gym today and visit each one?", "Did you try all the apparatus?", "What other equipment is close to you?"

The instructor mentioned the following fundamental movement patterns in this lesson: climbing, hanging, sliding, swing and jump. The movement terms used were: up, upside down, high, straight, over, under, and wide.

Common Phrases used by the children included: "Watch me!", "I can do . . .", "Look I'm . . .", and "Teacher, I can . . ."

Gymnastic Floor Plan 1



Lesson Plan 2 Experimental Group Data

Theme 2: The body can make shapes when moving and balancing.

Objective: The children were encouraged to focus on the body shape they were making on each piece of equipment in the play area. The instructor placed an emphasis on what shape the body made and how one shape was different from the others.

Sub-Objective: Review the concept of using the whole space and traveling to all the various pieces of equipment.

Observational Data: The children in today's lesson were much more responsive than on day one. They appeared to enjoy the concept of making shapes and holding them to show the instructor. The children moved more freely today, often in pairs or with a buddy. The girls in the group repeated several body shapes inside the frame of the trestles.Hanging upside down was still popular with the older children .The children were very aware of moving about the apparatus and not staying in one area too long. They liked to make tiny or curled shapes on the ground or under various pieces of equipment. Two girls began making shapes together, by holding hands. Several other children mirrored this behavior,and the instructor reinforced them. Very seldom did the children make an active or moving shape. Most shapes were held in a static position on a piece of apparatus or open space.The children were far more verbal today and enjoyed describing their shapes out loud. The group in general was far more focused on the lesson. There were fewer instances when objects were moved by the children.

The highest frequency of behaviors appeared to be: climbing, making balanced shapes, and hanging. Locomotion patterns between apparatus space were running, walking and hopping. Jumping was noted for the following pieces of equipment: Mats, ropes with cones, yellow box, steps, and the large trestle on to the foam mat.

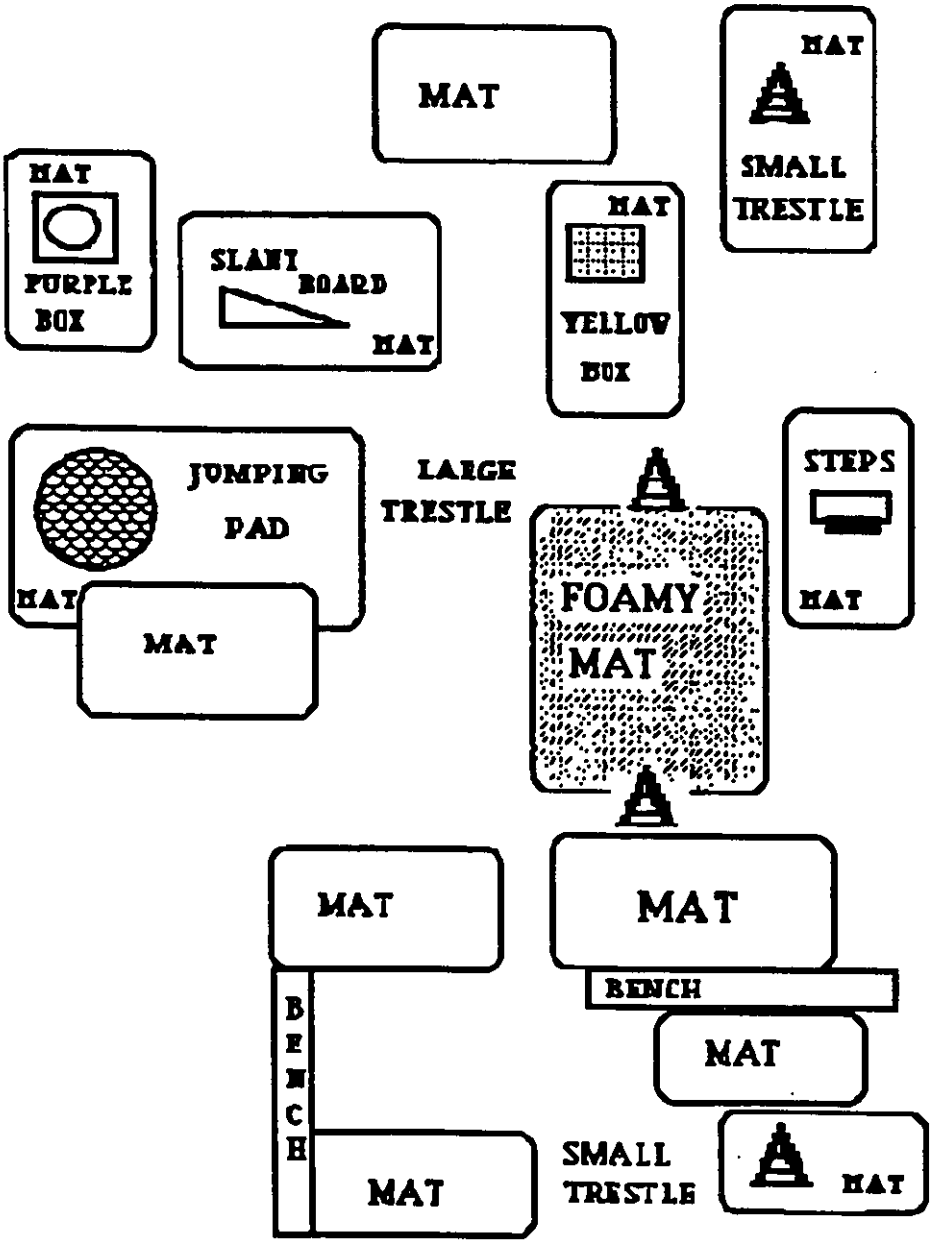
The instructor used the following key phrases to encourage the use of body shapes: "How can you make your body smaller?", "Can you find a

mat and make a stretched shape?", "How much space does your shape take?" "Look how tiny you are.", "How did you get into that shape?"

The following movement behaviors were mentioned in the lesson: rolling, crawl, swing, climb, jump, and slide. Descriptions for various movements were: tiny, small, skinny, stretched, wide, big, under, low, and twisted.

Common phrases used by children included: "Hey look, teacher!", "Want to see something?", "This is my shape?"

Gymnastic Floor Plan 2



Lesson Plan 3 Experimental Group Data

Theme 3: The body can move in any direction

Objective: The children were encouraged to use movements on various pieces of the apparatus by moving in a certain direction. This placed an emphasis on moving on or off the apparatus in a forward, backwards or sideways manner.

Sub-Objective: To review and identify a second time the body shapes made in lesson #2.

Observational Data: The children in today's lesson went on the apparatus far more quickly with less running in the open spaces. There was a natural trend to repeat the shapes made in the last lesson. Several children moved in partners together to make their shapes. The ropes and cones were interesting for some reason today,as the children moved them closer together to reduce the height of the rope. Several times in the lesson, the children were very aggressive working independently, with a reduced amount of caution.

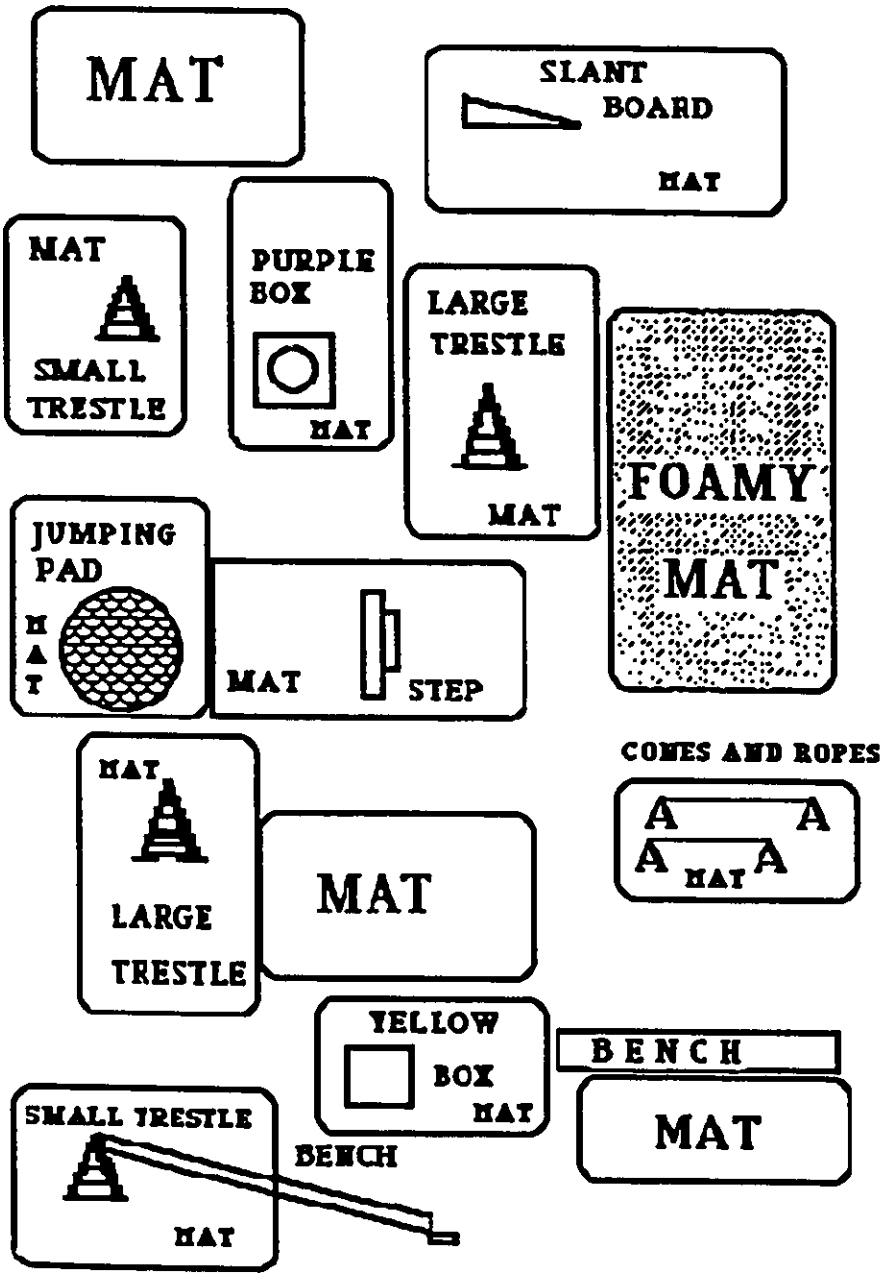
The children appeared to be more at ease and familiar with the apparatus. Two children spent a great deal of time on the benches, running down and across them. The children used the cones and ropes by, crawling under the ropes or stepping over them. The slant board and the incline bench were used for sliding in both a forward and backward direction. The children did not use the small trestles as frequently as the last lesson. The jumping pad was moved over to the steps for a landing surface. The children seem to enjoy moving in a forward direction then backward.

The highest frequency of behaviors were: sliding, rolling, climbing and jumping. Jumping was noted on the following pieces of apparatus: From the steps to the jumping pad, on top of the foamy mat, off the end of the slant board, and from the yellow box to the bench. The instructor used the following key phases in the lesson to emphasize the direction of the children's movement on the apparatus:"Which way are you going?", "Try turning around and going the other way.", "Can you see where you are

going?", "That's forward, can you try backwards too?", "What happens when your body is going sideways?", "Is it easier forward?"

The instructor mentioned movement patterns such as hopping, slide, hang, climb, run and jump. These descriptive words were used: forward, backward, sideways, turn, around, shape. Common phrases used by the children: "Look teacher!", "All by myself", "I'm going this way."

Gymnastic Floor Plan 3



Lesson Plan 4 Experimental Group Data

Theme 4: Moving over and under the apparatus.

Objective: The children were encouraged to find pieces of the apparatus that they could move either under or over. The instructor helped the children identify the movements as either going over or travelling under.

Sub-Objective: To review the directional theme from the last lesson by incorporating moving forwards, backwards and sideways as much as possible.

Observational Data: The children were not as active today, and yet they appeared to take more time on each piece of the apparatus. The older children really enjoyed the bench on the large trestle, and its high angle.The wooden shapes were used more for going under and crawling through today. In fact if one child tried to dismantle them, another child would set them up again. The small trestle and bar were popular for younger children, especially the girls. The jumping pad was moved off the mat space out into the centre of the gym floor.The two children who moved the pad were more interested in getting inside the cover of the pad than jumping on it. One child discovered that she could fit through the space in the slant board, by crawling though. The other children tried this activity also, following the first child's attempt. Two younger girls, began to immitate "kitty cats"as they crawled through objects. When asked about this they said their cats at home could go under anything. The children did try jumping over the bench and the slant board today, with two foot takeoffs.

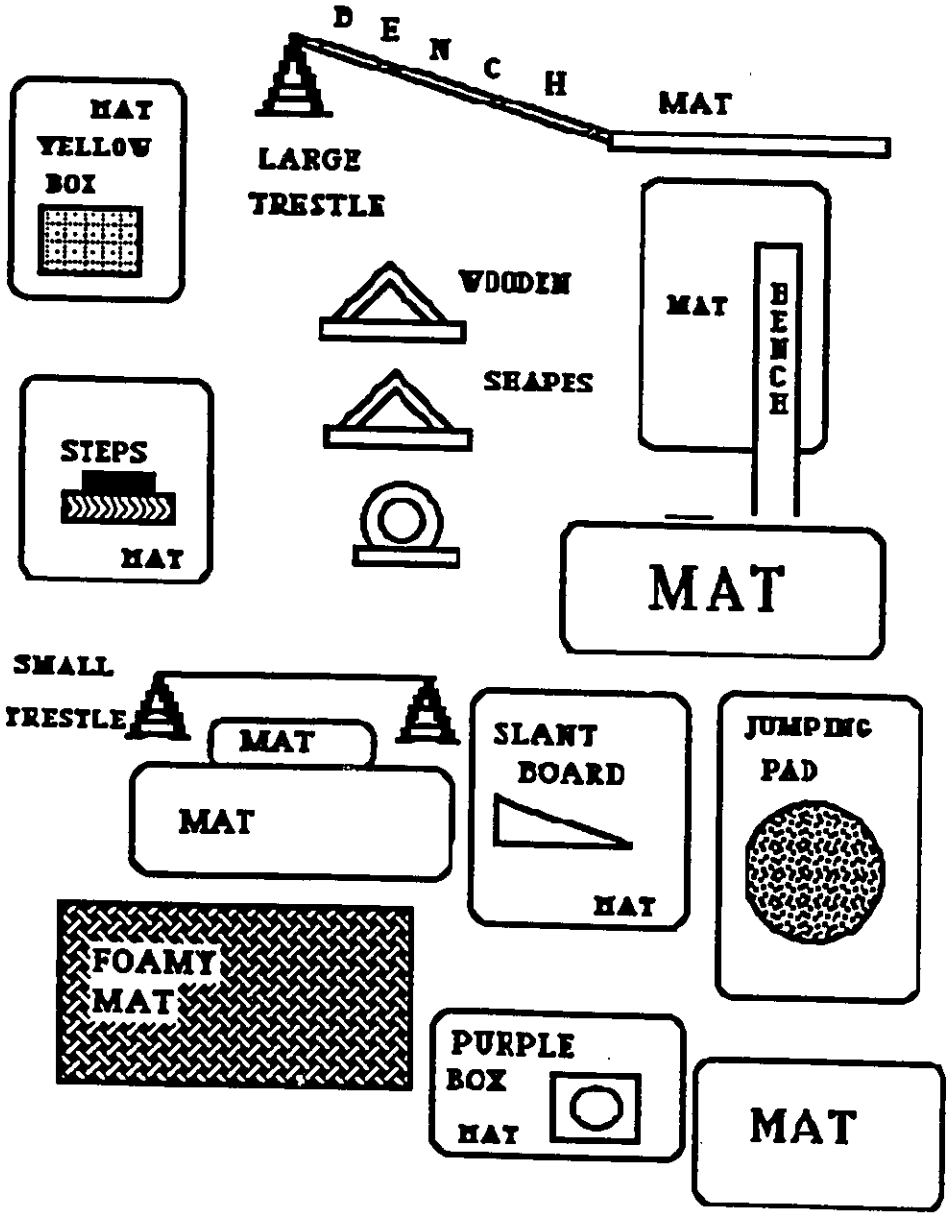
The highest frequency of behaviors appeared to be: climbing, sliding, crawling and rolling. Jumping was noted for the following pieces of equipment: on top of the large foamy, off the steps, off the end of the benches, top of yellow box. The instructor used the following key phrases to encourage the children to move over or under objects: "How can you get over?", "What can you do in this space?", "When you are down there what can you do?", "Can you get to the other side?", "What happens when you

go over and under?", "You went over, is there a way to get under there?", Which way are you going?"

The following movement patterns were mentioned in the lesson: sliding, crawling, rolling, swing, and jumping. Movements were described with terms such as: under, over, up & over, through, low, forward,backward, and side.

Common phrases used by children included: "I'm going like this . . .", "Teacher, look what I can do.", "I can go under here . . ."

Gymnastic Floor Plan 4



Lesson Plan 5 Experimental Group Data

Theme 5: What can your feet do.

Objective: The children were encouraged to explore the apparatus with special attention given to their feet and how they were used to create a movement or static position. The instructor placed an emphasis on one or two foot actions, keeping the feet close together or wide apart, moving on toes or flat feet.

Sub-Objective: To incorporate the concepts from the last lesson with various foot positions, static or moving.

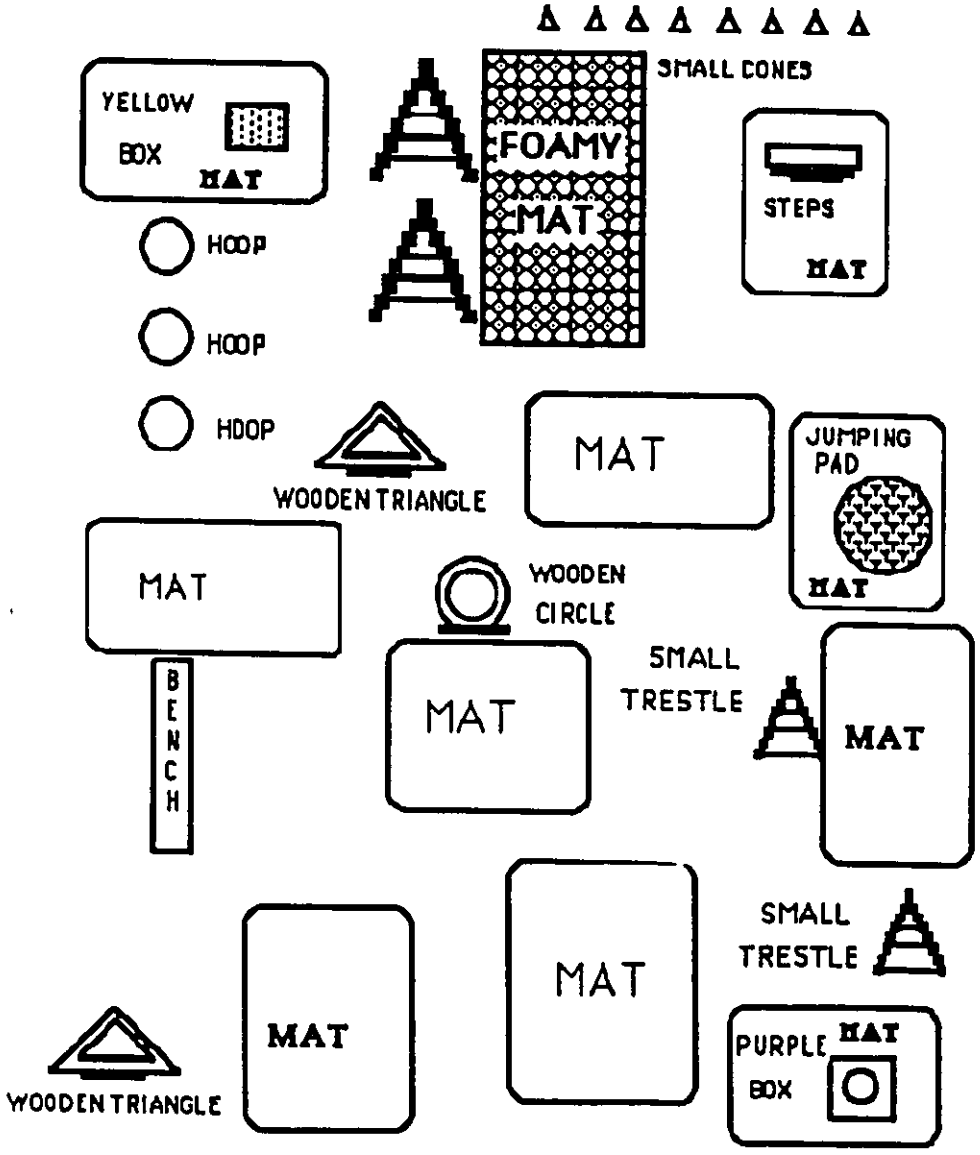
Observational Data: The children were very lively today. The boys experimented with the small cones almost immediately. They picked them up for props and ran in the open spaces. The instructor did intervene by suggesting the cones would be better on the floor. The boys said they were playing war and needed them for swords. The girls in class settled the situation by jumping over the other cones in the area and eventually the boys did the same. The children were challenged by the large trestles and foam mat below. Several children made jumps from the very top of the trestle into the thick mat below. The children spent a great deal of time on the bench and mat combinations. A number of the younger children walked along the benches or pulled themselves on their tummies. The older children hopped or ran along the bench. Some children repeated the over and under movements in the same way as in the last lesson. The small trestles were not used as much today and no one sat inside the purple box. Most children were on the move with a high amount of chasing between the boys and the girls. Several children made comments on the size of their feet, their new running shoes, or how fast their runners could go. There were only four times when the children moved the small equipment today (cones and hoops) to suit their own needs.

The highest frequency of behaviors appeared to be: walking along the benches, running, jumping off the large trestle and jumping into the hoops.

Jumping was noted for the following pieces of equipment: large trestle to foamy mat, hoops on the floor, off ends of benches, off yellow box and on the jumping pad. The instructor used the following key phrases to encourage children to focus on their feet and how to use them in various ways: "What body parts did you use to get up the climber?", "What do your feet do when you go through the hoops?", "Can you step off the box?", "How many feet did you use that time?", "Show me your feet.", "One or two feet?"

Comments from the children included: "My feet are big . . .", "Can I take my shoes off?", "My feet are fast . . ."

Gymnastic Floor Plan 5



Lesson Plan 6 Experimental Group Data

Theme 6: The Body can Twist and Turn

Objective: The children were encouraged to find ways of turning or twisting the body. The instructor also placed an emphasis on the pieces of equipment the children could turn on or twist off of.

Sub-Objective: The turning and twisting movements were introduced by talking about the feet again, and how we could use them to make the turning movement or use the feet to twist the body.

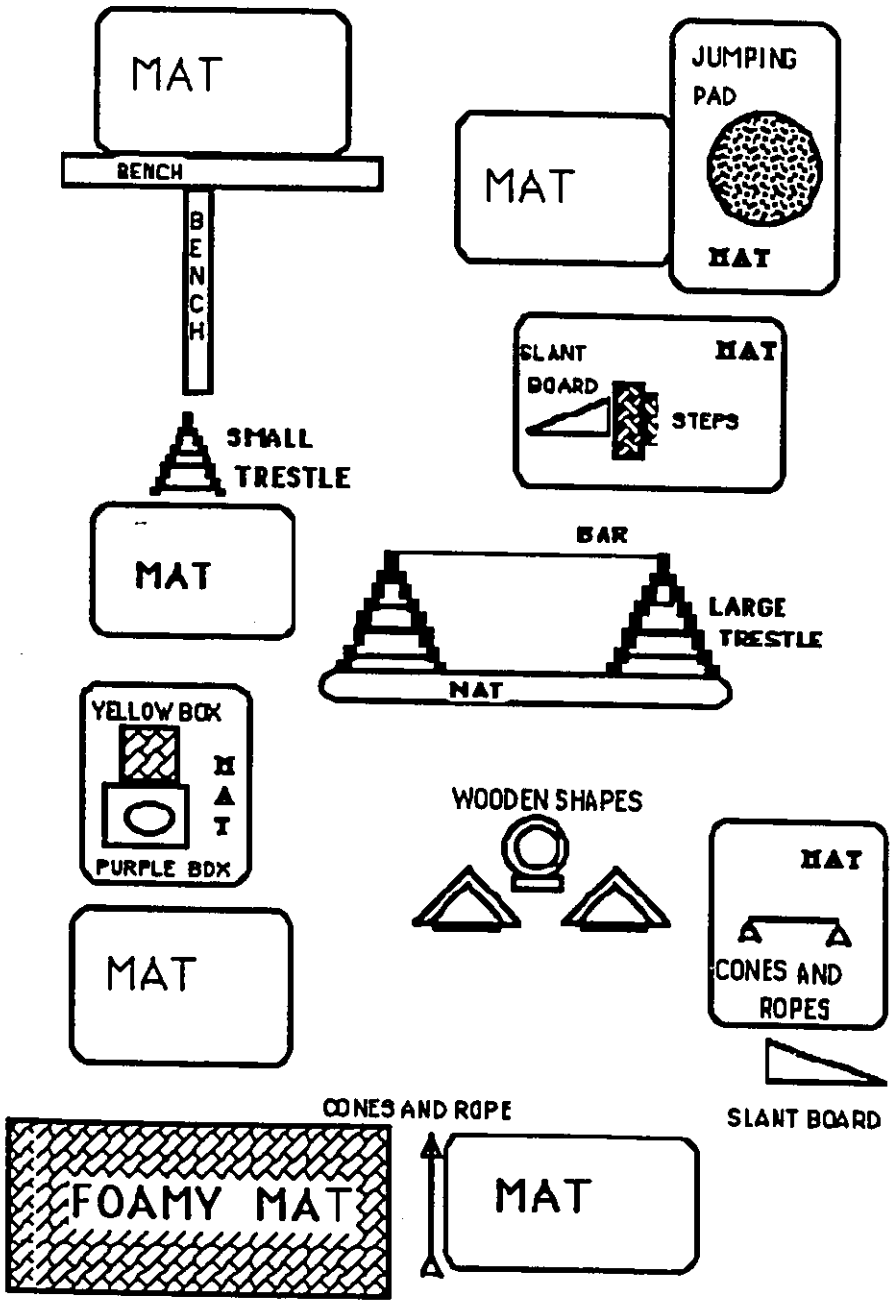
Observational Data: The children came to the gym with a lot of energy from being indoors due to the poor weather. The boys were especially vigourous, running in every direction and chasing each other around the equipment. This type of behavior continued for the first five minutes of class time until they had reached some level of fatigue. The older girls went right to the hanging bar and the large trestles. A group of three girls all tried hanging upside down at the same time. When the children were challenged to turn, they generally moved half way around to face the opposite direction. One boy used the jumping pad for jump turns in the air. When asked to show a twisting shape, most children demonstrated a static shape on the floor, with their arms and legs crossed. One of the older children did a twist by hanging on the bar with her legs wrapped around it, holding on with one hand and twisting her upper torso. Most full turns occurred on the benches with mats on each side. One child completed almost a full turn off the steps in the air, and landed sideways on the mat. Two younger girls watched but did not attempt this movement. Two girls in class today dismantled the wooden trianglesand got rid of the blocks holding then up. They set up the triangles in the crease of one of the mats. In this way the wooden triangle would not fall down as easily or make alot of noise when it tipped over.

The highest frequency of behaviors for this lesson appeared to be: running, climbing, rolling, and holding twisted shapes. Jumping was noted for the following: jumping pad, cones and ropes, foamy mat and off the

yellow box and bench. The instructor used the following key phrases to encourage children to turn or twist: "How can you turn around up there?", "Face the other way now.", "Can anyone turn and travel to a new space?", "How can you twist all up?", "Can you turn in the air?", "How far around did you go?", "Turn now."

Common phrases used by the children: "Look here, see me?", "Can you help me on the bar?", "I can go like this . . ."

Gymnastic Floor Plan 6



Lesson Plan 7 Experimental Data

Theme 7: The body can move along and through objects.

Objective: The children were encouraged to travel in any way around the apparatus space and to find various ways of going through objects (no sub-objective was used).

Observational Data: The lesson today did not go as smoothly as others. The children did not have as much energy. This lesson was at the end of the week, so perhaps the children were tired. It was generally harder to keep them active and motivate them. The smaller equipment was not moved or rearranged by the children.

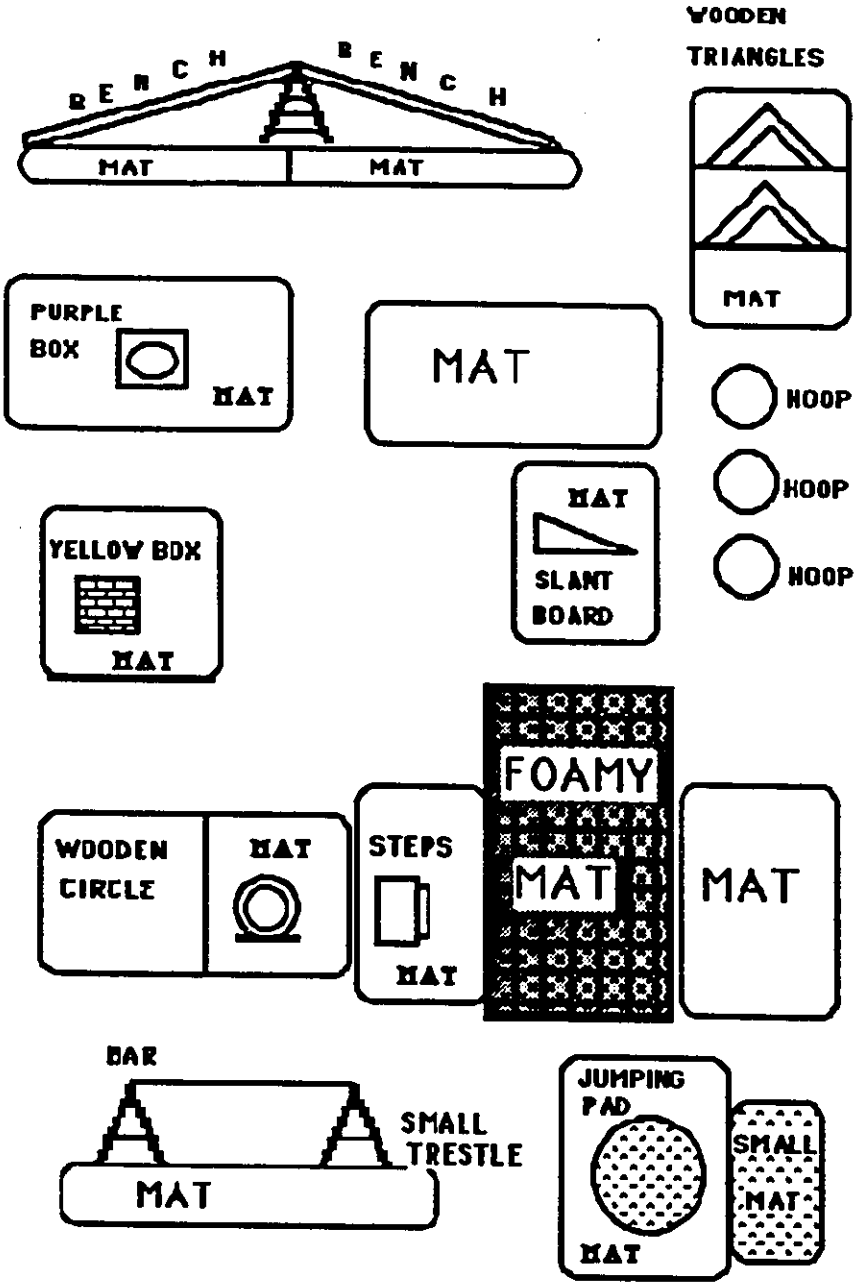
The two girls who had moved the wooden triangles in Lesson 6 were happy to see it set up the way they had left it. The younger children liked the idea of finding objects to go through. Most of their movement through the objects such as the purple box, the wooden triangles and hoops or circles were done in a low crouch, or crawl. Two of the younger girls made meowing sounds like cats.When asked about it, they said their "kitty cat" made that sound when she was hungry. The older children in the group spent a great deal of time on the large trestle and benches. They seemed to like the height. One child asked the instructor to hold the hoops upright so that she could go through by herself.

The behaviors with the highest frequency appeared to be: climbing, crawling, sliding and hanging. Jumping was noted on the following apparatus: mats, jumping pad, off trestle, in the hoops and off the end of the slant board and yellow box.

The instructor used the following key phrases to encourage the children to find objects to move through and ways of doing so: "How can you get through there?", "Why did that tip over when you went through?", "Go through this one and over this one.", "What can you do to get to the other side?", "Why can't you go through here?", "Can anyone find something to go through?"

Common phrases used by the children: "I like to go this way.", "I'm the highest", "Meow!"

Gymnastic Floor Plan 7



Lesson Plan 8 Experimental Data

Theme 8: The body can connect movements together: link and repeat.

Objective: The children were encouraged to use all the equipment in the gym space and to try to put two or more movements together.

Sub-Ojective: To provide more interesting shapes for the children to attempt the concept of "through" from last day.

Observational Data: The children were back on track again. They moved very well today and were excited about the floor plan and the equipment along the parameters of the gymnasium. The children repeated several movements from the last lesson. Some children played a follow the leader type of activity, by moving around the curcuit of equipment in a clockwise manner. The younger children watched this and began doing the same thing. The children were introduced to the concept of making movement sentences i.e., putting one movement with another. The challenge to put three movements together was meet with great enthusiasm by the children. The instructor encouraged the children to call out their movements before they did them on the apparatus. An important improvement in this lesson was that the children could call out what they were going to do, and then actually execute the movement pattern. Most children selected movements that they had repeated several times in other lessons. For example, one girl liked hanging, so this movement was always a part of her movement sentence. When the children were tired or needed a time out, they went to the large foam mat in the centre of the gym floor. The highest frequency of behaviors appeared to be: climbing, hanging, running and jumping.

Jumping was noted on the following pieces of equipment: jumping pad,mats, on the floor, off the yellow box, along the bench, and on the large foamy in the centre of the gym.

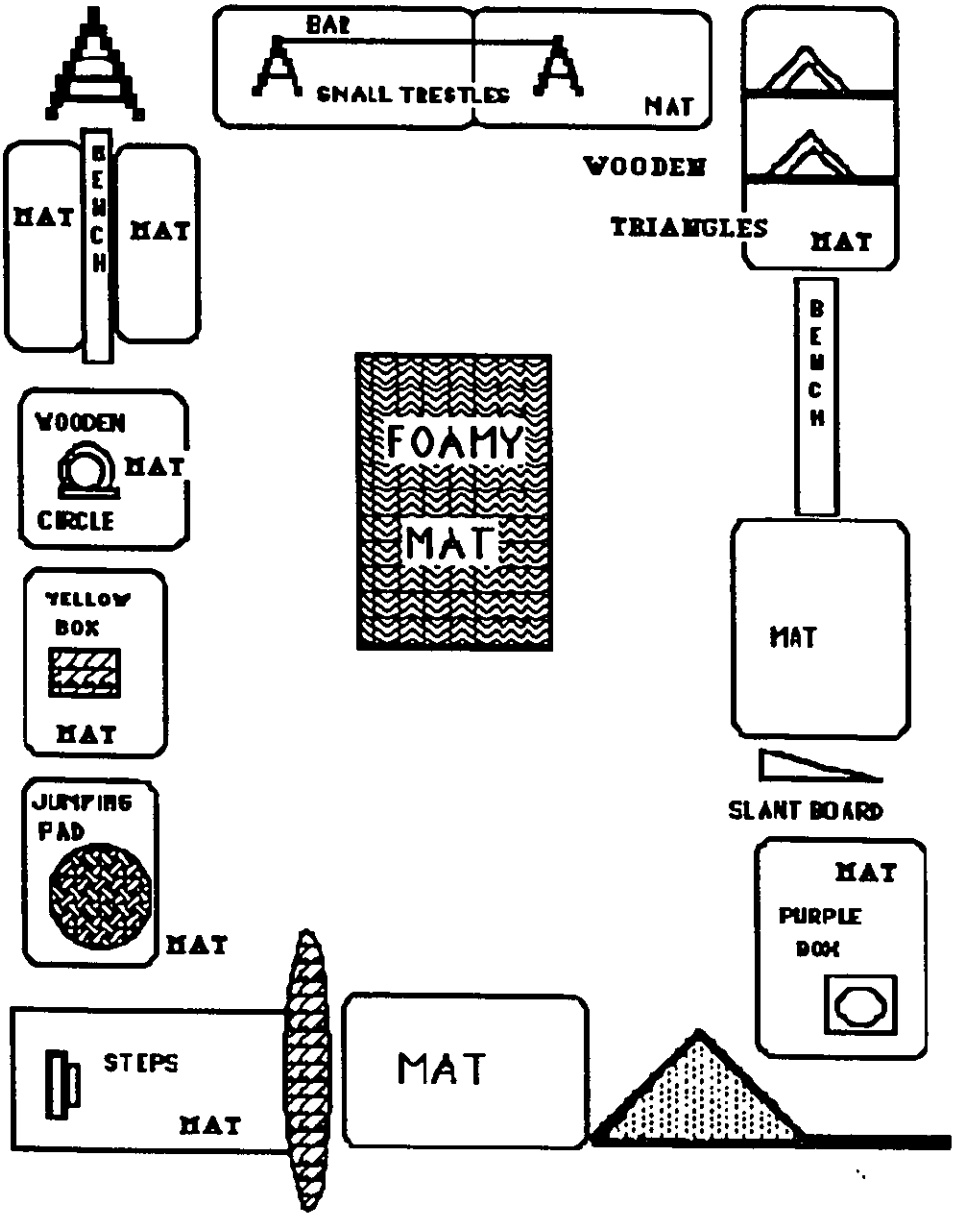
The instructor used the following key phrases to encourage the children to link their movements together and to repeat movements: "What can you do now?", "What did you do to get there?", "Can you try it again

in a different order?", "Find two things to do", "After you are finished, find two more.", "Can you change that one?", "Who can make a sentence with their movements?", "My sentence is climb, swing and jump.", "Can you tell me what you are doing?"

The following movements were mentioned: running, jumping and climbing. Other descriptive terms included: under, over, around, together on, off, and travel.

Common phrases used by the children: "Hey look at me!", "Easy . . .watch me!", "Teacher my sentence is . . .", "I can do that!"

Gymnastic Floor Plan 8



Lesson Plan 9 Experimental Data

Theme 9 The theme from Lesson 8 was repeated. The body can move: linking movements and repeating.

Objective: The children were encouraged to experiment further with the movement sentences from the last lesson. The instructor focused on challenging the children to add on to their sentences and repeat the movements a number of times.

Sub-Objective: To observe the same behaviors with a different floor plan.

Observational Data: The children in today's lesson were confident in their choice of movements. The children were able to say what they were going to do, complete the movement pattern and tell you again what they did. The variety of movements was very good. Most children incorporated their favorite movement, or one that they had repeated before in their sentence. Some children would just, move about freely in the open space and then copy someone elses movements. This was done often by the younger children, who seemed to mirror the older children's movements.

The children were challenged by the notion of making longer sentences. One girl told the instructor she was going to go on every piece of equipment. The instructor stopped the class momentarily, so that all the children could watch her. This led other children to move around the gym space at a faster rate, using a larger portion of the gym. The small cones were the only objects to be moved by the children.

The highest frequency of behaviour was difficult to assess today. The most common movement sentences were: a) run, climb, jump; b) roll,run, climb; c) climb, hang, swing; and d) crawl, climb, jump off.

Jumping was noted on the following apparatus: mats, ropes and cones,benches, jumping pad, off yellow box and steps, foamy mat, off small trestle and the end of the slant board.

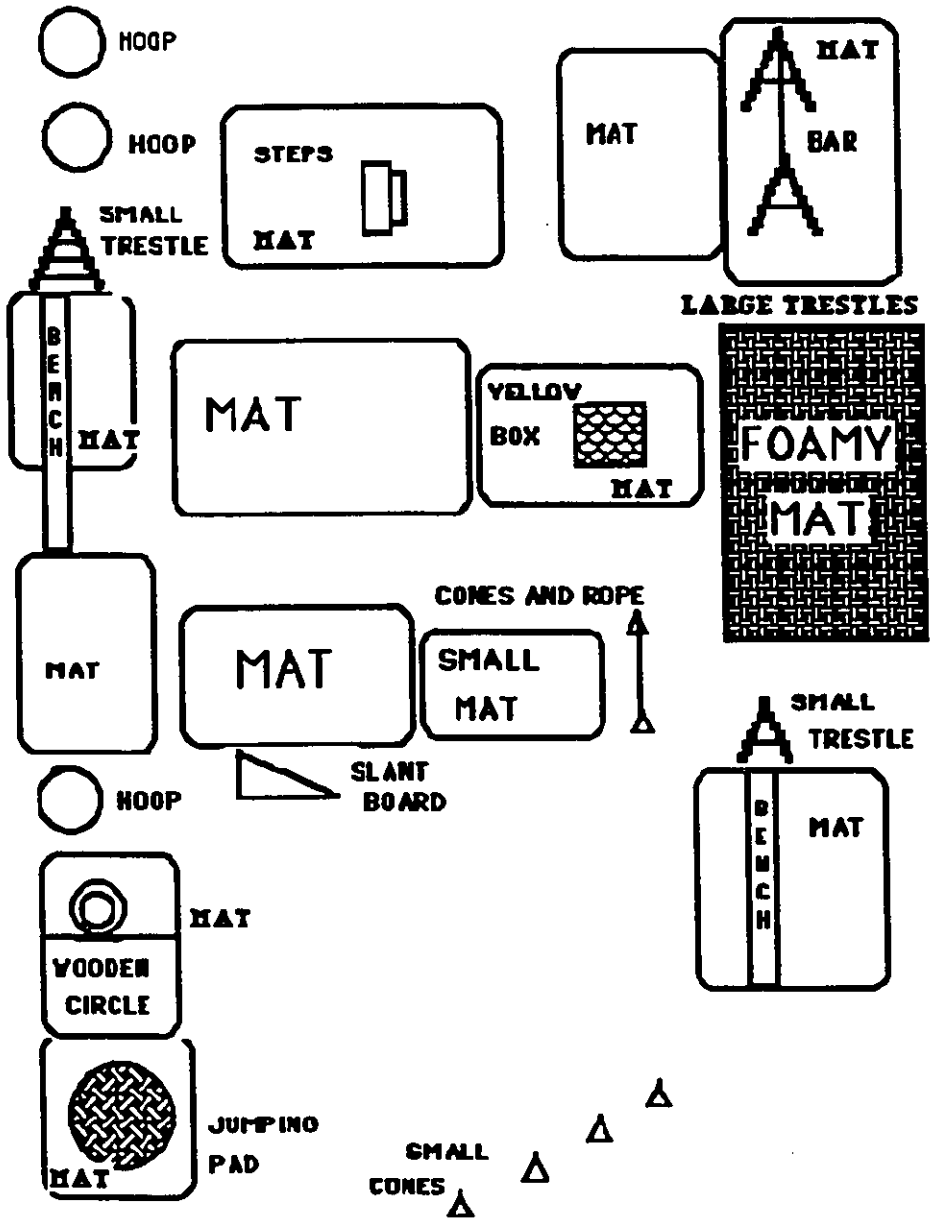
The instructor used the following key phrases to encourage the children to complete movements that were linked together: "What is your

sentence today?" "Can you find something new today?" "How many can you do in a row?", "Do something after that now.", "Can anyone do four movements in a row?", "Put your movements together and then tell me what you did.", "Did you use all the equipment?"

The following movements were mentioned by the instructor: run, jump, swing and turn. The instructor used descriptions such as together, twisted up, moving, and travel.

Common phases used by the children: "Easy . . . I can do that one.", "My sentence is big . . .", "Watch me I can do it all!"

Gymnastic Floor Plan 9



Lesson Plan 10 Experimental Data

Theme 10 Moving with a partner: what can you do together?

Objective: The children were encouraged to work with a partner for the final lesson. The instructor encouraged the children to share their movement sentences, and to travel with their partner. The intent of the partner work was to increase the modelling of movement behaviors, which may in turn encourage some children to move with a higher frequency and more variety.

Sub Objective: The concepts from lesson 1-3 were used to review the basic concepts of direction, shape and wide use of equipment.

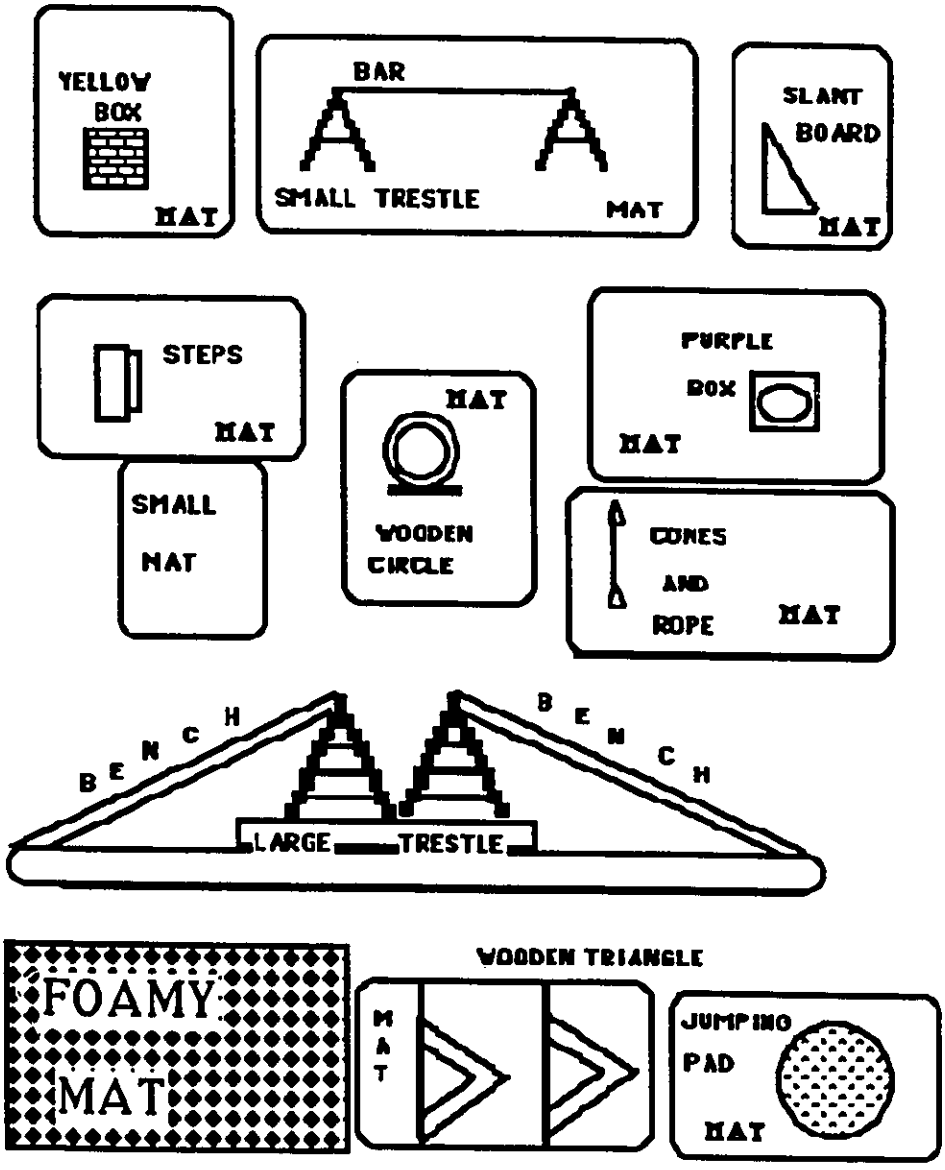
Observational Data: The children in today's lesson liked the idea of having a partner to work with. The older children were able to mirror each other better than the younger children in the group. The younger children saw their partner more as a companion, instead of someone they could share movements with. The older girls showed the most variety and made very interesting shapes on the trestles with the benches on an incline. The boys were more interested in racing and chasing their partners and rolling on the foamy mat in a rough and tumble manner. The children spent short periods of time with their partner before they went off on their own again and played on the apparatus alone. The children did like finding a new buddy, and yet they did not stay with the buddy for any length of time. Some children, were able to create new movement sentences from their partner's ideas. The more confident and dominant movers tended to command the way the pair would move and what piece of apparatus they would travel to next.

The behaviours displayed most frequently were climbing, hanging, running, chasing and rolling. Junping was noted on the following equipment: end of the benches, yellow box, jumping pad and the bottom of the small trestles. The instructor used the following key phrases to encourage the children to move actively in pairs: "Can you find a buddy?" "What is your buddy doing?" "Can you do that?" "When you move, make

your partner follow you." "Make shapes with your buddy." "What can you do together?" "What type of movement sentence can you make?" "Is it like your partner's?" "How are your sentences different from your partner?"

Common phrases used by the children included: "Look what I can do.", "No, let's do this . . .", "Come on!"

Gymnastic Floor Plan 10



Testing Floor Plan